City of Seattle
Office of Sustainability and Environment
Office of Economic Development

Sustainable Building Cluster Study

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FINAL REPORT

BERK & ASSOCIATES

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"Helping Communities and Organizations Create Their Best Futures"

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EXECUTIVE SUMMARY

The City of Seattle's Office of Sustainability and Environment (OSE) and Office of Economic Development (OED) seek to develop an economic development strategy to accelerate the growth of Seattle's Sustainable Building industry and the local economic cluster that supports the industry (Sustainable Building Cluster).

Sustainable Building is an industry term for buildings that are water and energy efficient; minimize waste; maximize use of recycled materials; create healthy indoor environments for workers; employ resource-efficient materials and incorporate environmentally sensitive site planning. The City has determined that the growth of the Sustainable Building industry in Seattle has come with a concentration of local expertise, service and materials providers, which represent a significant source of current and future jobs.

To develop an effective strategy, the City needs to better understand the current industry and its opportunities for, and barriers to, job growth.

This report presents findings and analysis of Seattle's Sustainable Building Cluster and includes recommendations about what the City can do to accelerate the growth of the Sustainable Building Cluster.

An important aspect of understanding the Sustainable Building Cluster is that it is a subset of the overall building industry. Some firms are focused primarily or exclusively on Sustainable Building, but their projects comprise only a small percentage of Seattle's Sustainable Building Cluster.

This study profiles the economic activity of the Sustainable Building Cluster within the City. Like all construction, Sustainable Building is present in the City in two ways: (1) individuals, businesses and organizations based in the City; and, (2) construction activity that occurs in the City, frequently involving workers based in other areas.

Sustainable Building Cluster Definition

Understanding the Sustainable Building Cluster requires an assessment of more than just those companies commonly referred to as "sustainable" or "green." While some firms focus primarily on Sustainable Building, many more participate in the cluster without identifying their work or their products as sustainable. The Sustainable Building Cluster is comprised of four over-arching types of activity: Production, Provision, Consumption, and Facilitation.

- **Producers** generate materials by reclaiming them from existing structures or harvesting urban trees that would otherwise be chipped or landfilled; more sophisticated production involves manufacturing building materials from extracted raw materials.
- **Providers** are distributors and suppliers of building materials; architects, designers, and engineers; builders; and sellers who connect finished buildings with end users.
- **Consumers** are the clients, individuals, companies, governments, and non-profit organizations that purchase finished buildings, construction/design services, and building materials from Producers and Providers.
- **Facilitators** are the organizations and governments that regulate, innovate, and educate the other parts of the cluster.

Sustainable Building Certification. Both nationally and in the City of Seattle there is a strong upward trend in Sustainable Building activity. One of the best indicators of this trend is the number of projects that have been registered with the United States Green Building Council (USGBC) or have been certified by the USGBC for Leadership in Environmental and Energy Design (LEED™).

The number of LEED™ registered and certified buildings nationally has increased over the past four years from fewer than 50 projects in 2000 to nearly 400 projects per year in 2003, encompassing over 50 million square feet of development.

Buildings certified under LEED™ provide an important indicator of the level of activity, but this metric does not capture all Sustainable Building. Many developers do not choose to register or certify their buildings, and a substantial amount of home renovation and remodeling incorporates sustainable products and methods not captured by the LEED™ system.

Key Drivers of Seattle's Sustainable Building Cluster

- **Building Policies.** Seattle's Sustainable Building Policy of 2000 establishes LEED™ certification (LEED™ Silver) as the performance standard for public buildings over 5,000 square feet. The policy was the first of its kind in the United States, and has served as a catalyst to grow the Sustainable Building industry in Seattle. By targeting LEED™ Silver, the City helped the local building industry to learn to build sustainably and within available budgets. This industry knowledge has transferred to other public and private buildings.
- **Increasing Costs of Non-Renewable Resources and Lower Operating Costs.** The long-term outlook for non-renewable resources has led to increased interest in Sustainable Building. Many builders look to efficient designs and high performance systems as the best new method of reducing energy use. By definition, sustainable buildings are more efficient and carry lower post-occupancy operating costs than conventional building.
- **Greater Environmental Awareness.** The strong growth in demand for sustainable development in the private sector reflects growing consumer interest in environmental protection and personal health. The Seattle public is well educated and has been attentive to emerging housing and office alternatives.
- **Worker Recruitment, Retention, and Productivity**. There is a growing body of evidence to suggest that the indoor environmental quality of commercial buildings has a profound effect on workers' health, productivity, and attitude. Some local developers see tenant demand for Sustainable Building. Several studies point to employees' improved, better attendance, and higher productivity in sustainably built environments.

Sustainable Building Measures and Indicators. The following metrics gauge activity in the Sustainable Building Cluster:

- **Percentage of LEED™ Registered and Certified Buildings.** The U.S. Green Building Council estimates that 3-4% of construction nationally is Sustainable Building based on LEED™ registrations. This estimate is very conservative because many buildings may have sustainable elements, but do not seek certification.

- **Percentage of LEED™ Accredited Professionals.** Seattle ranks number one in LEED™ Accredited Professionals. The majority of these are architects, indicating a strong Sustainable Building presence in the design community.
- **Commercial Buildings Utilizing the University of Washington's Daylighting Lab.** LEED™ commercial projects work with the University of Washington Daylighting Lab to design effective daylighting techniques that reduce dependency on electricity providers. This Lab provides technical assistance to about 10% of the commercial buildings in Seattle.
- **Percentage of New Homes Certified Under the Built Green Program.** The Master Builders Association of King and Snohomish Counties certifies sustainably built homes under their "Built Green" program. As of September 2004, 17% of all newly constructed single family homes in King and Snohomish Counties were certified. Membership in Built Green has increased from four firms in 2000 to 200 in 2004.
- **Percentage of Sustainable Activity by Firm.** Stakeholders interviewed for this study estimated the percentage of their business conducted in Seattle, and the percentage of their business considered sustainable. Most individuals interviewed work for firms primarily focused on Sustainable Building; their estimates of the percentage of business devoted to Sustainable Building ranged from relatively low (5%) to very high (several are 100% engaged in Sustainable Building). For the balance of the Sustainable Building Cluster, most firms' participation in Sustainable Building composes a low percentage of their work. The Environmental Home Center estimates that 10% of all material sales are for sustainable products.
- **Percentage of Local Work Conducted in Seattle.** Most of the firms that are involved in the sustainable building sector conduct more than half of their business outside the City of Seattle, showing strong demand outside of the City for Seattle-based Sustainable Building services and expertise.

Sustainable Building Cluster Economic Activity

Sustainable Building Portion of the Building Industry. Analysis based on such metrics (including percentage share of LEED™-Certified commercial buildings and others) yields a Cluster-wide estimate that Sustainable Building represents between 4% and 12% of the entire building industry.

Companies. Nearly 34,000 companies participate in the building and construction industry in Seattle, all of which are likely affected and participate in some way in Sustainable Building. Interviews conducted for this study identified 230 firms with a clear presence in the Cluster, listed by name and relevance in Attachment B.

Jobs and Wages. The estimated portions of economic activity in the building industry associated with the Sustainable Building Cluster suggest that Sustainable Building activity directly accounts for the equivalent of between 1,370 and 4,160 jobs and between $60.2 million and $195.2 million in wages paid.

Gross Revenues. The low estimate of the Gross Revenues of the Sustainable Building Cluster in Seattle is $316.8 million, or 4% of the building industry as a whole. The high estimate is $1.0 billion, or 12% of the building industry as a whole. The mid-point of the range is $671.8 million.

Taxable Retail Sales and Sales Tax Revenues. More than 80% of the sales tax revenue generated by Sustainable Building activity in Seattle comes from contractors, including General Building Contractors and Special Trade Contractors The Cluster generates between $906,000 and $2.9 million in sales tax revenue for the City (midpoint is $1.8 million).

Business & Occupations Tax. The City of Seattle reports Business and Occupations (B&O) tax receipts for the City's building-related activities to total $18.1 million in 2002. The estimates of Sustainable Building activity as a percentage of all building activity suggest that City B&O receipts associated with Sustainable Building totaled between $649,000 and $2.1 million in 2002, or 4%-10% of the City total. The midpoint of this range is $1.5 million in B&O receipts.

Recommendations to Support the Sustainable Building Cluster

Policy recommendations brought forth by City staff based on this report, stakeholder interviews and other City research include the following:

- Develop a City-wide sustainable building policy for private developers that will encourage the design and construction of sustainable buildings
- Provide incentives for sustainable building projects, such as increased floor-area-ratios, height, and density bonuses
- Maintain and expand the City's LEED™ and BuiltGreen incentive programs.

Creating Markets

- Actively encourage product suppliers to locate in Seattle
- Host national and regional conferences on sustainable building and encourage National Sustainable Building associations to locate in Seattle

Permitting

- Accelerate the SEPA and Master Use Permit timeline for sustainable buildings and guarantee developers expedited permitting
- Provide fast-track building permits for sustainable buildings
- Reduce costs charged by the City to Sustainable Building businesses (e.g., permitting, recycling, and waste fees)

Technical Assistance/Education

- Support the creation of the Sustainable Development Center
- Continue to develop case studies for City LEED™ projects
- Support the development of materials for home remodeling projects and conduct trainings in local libraries
- Work with groups such as the Cascadia Chapter of the Green Building Council and the Urban Land Institute to conduct workshops, trainings, and lectures on sustainable building
- Work with the University of Washington and other local training institutions to advance curricula related to sustainable practices

CONTENTS

INTRODUCTION

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

--Brundtland Commission Report, World Commission on Environment and Development, 1987

Sustainable Building consists of *"designing, constructing and operating buildings and landscapes to incorporate energy efficiency, water conservation, waste minimization, pollution prevention, resource-efficient materials, and indoor environmental quality in all phases of a building's life."*

--1999 Northwest Regional Sustainable Building Action Plan, City of Seattle

The City of Seattle's Office of Sustainability and Environment (OSE) and Office of Economic Development (OED) seek to develop an economic development strategy to accelerate the growth of the City's Sustainable Building industry and the local economic cluster that supports the industry (Sustainable Building Cluster).

Sustainable Building is an industry term for buildings that are water and energy efficient; minimize waste; maximize use of recycled materials; create healthy indoor environments for workers, employ resource efficient materials and incorporate environmentally sensitive site planning. Developing these buildings requires an integrated approach to project development that accounts for the interaction of building structure and systems. The City has determined that the growth of the Sustainable Building industry in Seattle has come with a concentration of local expertise, service and materials providers that also represent a significant source of current jobs and future growth.

To develop an effective strategy, the City needs to better understand the current industry and its opportunities for, and barriers, to job growth.

This report presents findings and analysis of Seattle's Sustainable Building Cluster and includes recommendations about what the City can do to accelerate the growth of the Sustainable Building Cluster. The City's Sustainable Building Cluster is rooted in the region's concentration of design professionals, engineers, suppliers, developers and contractors. An important aspect of understanding the Sustainable Building Cluster is that it is a subset of the overall building industry. Some firms are focused primarily or exclusively on Sustainable Building, but their projects comprise only a small percentage of Seattle's Sustainable Building Cluster.

This study profiles the economic activity of the Sustainable Building Cluster within the City. Like all construction, Sustainable Building is present in the City in two ways: (1) individuals, businesses and organizations based in the City; and, (2) construction activity that occurs in the City, frequently involving workers based in other areas.

The City's Sustainable Building Policy of 2000 directed all new and major remodeled City facilities and buildings (with more than 5,000 gross square feet of occupied space) to meet or exceed an industry standard known as LEED™ (Leadership in Environmental and Energy Design) Silver. The policy served as a catalyst for

growth in the local and regional Sustainable Building industry. Private developers are rapidly increasing the number of privately funded Sustainable Buildings in Seattle, and strengthening the City's reputation as a national and international center for Sustainable Building.

Report Organization

The remainder of this report is organized as follows:

- **Understanding Sustainable Building Cycles.** An overview of Sustainable Building.
- **Cluster Activities and Network Components.** A description of the economic activities that relate to the Sustainable Building industry and form the Cluster.
- **What's Driving the Trend.** A discussion of the forces driving cluster growth.
- **Leaders in the Seattle Sustainable Building Cluster.** Profiles of the businesses and organizations interviewed as part of this study that illustrate a variety of project work and levels of involvement in the industry.
- **Case Study: Seattle Justice Center.** A profile of one City of Seattle sustainable building, to illustrate the connections within the Seattle Sustainable Building Cluster.
- **Sustainable Building Cluster Economic Analysis.** A discussion of the different approaches used to measure the sustainable portion of the Seattle building industry. Analytical findings of jobs and wages, revenues and public revenues, based on jobs in the Seattle building industry as a whole and interview findings are presented.
- **Policies to Encourage Sustainable Building.** An overview of steps the City can take to encourage Sustainable Building.
- **Summary and Recommendations.** Key findings and recommendations for the City.

UNDERSTANDING SUSTAINABLE BUILDING

Characteristics of Sustainable Building

Sustainable Building is an approach to constructing buildings that minimizes impacts on the natural environment. More specifically, under this model, the materials with which buildings are constructed are made from less energy-intensive processes; minimize the use of toxic and non-recyclable materials; are frequently re-used or recycled materials; and are typically generated locally. The mechanical and electrical systems in Sustainable Buildings tend to be more sophisticated and higher performing than those in traditional buildings and use fewer natural resources once completed. Sustainable Building methods reduce reliance on resources, for example by using daylight and natural ventilation to decrease reliance on artificial lighting and air conditioning. Urban design is reflected in Sustainable Building as well; Sustainable Buildings are sited in areas with infrastructure in place, where mass transit, cycling, and walking are viable means of transportation for building occupants.

Origins of the Building Process

As shown in Exhibit 1, the Sustainable Building Cluster exists within the larger building industry and the cycle of building materials that sustains the industry. The traditional process starts where resources are mined, drilled, or harvested from the earth. Raw materials feed into the sphere of Sustainable Building activity, beginning with the refining and manufacturing processes. At this point, sustainable manufacturing and efficient production systems increase productivity and decrease waste. In some instances, industries incorporate waste from later stages of the building process or locate near manufacturers to utilize their byproducts as inputs to their own production system.

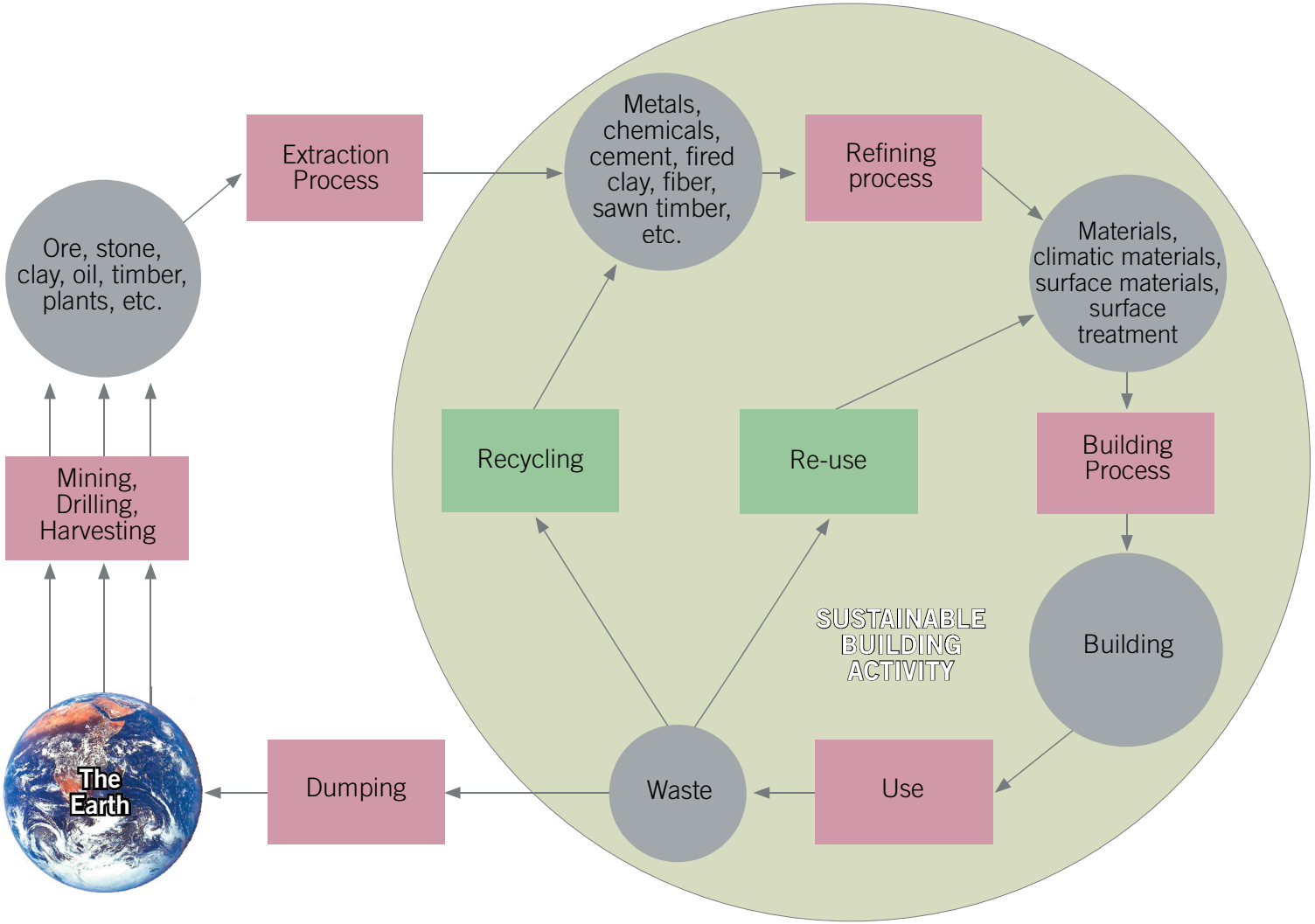
Valued-Added Services and Systems

The next step in the cycle is described as the "Building Process," where the design work occurs. Architects, engineers, consultants, regulators, and their clients all interact to generate plans for building. Many sustainable features are introduced during this design stage through natural lighting, ventilation systems, energy and water conservation, selection of sustainable materials and site selection.

Construction and Re-Use

In the next stage, "Building," the finished building materials are used in construction. Contractors minimize waste production and protect existing natural resources (where applicable) by using sustainable methods during the construction process. After construction is complete and the building is occupied, waste materials are either re-used on future projects, recycled and fed back into the manufacturing portion of the cycle, or dumped into sanitary landfills. This step repeats when a building reaches the end of its useful life and its materials are either re-used, recycled, or disposed.

Exhibit 1:
Sustainable Building Process Within the Cycle of Building Materials



After Bjorn Berge, Ecology of Building Materials, 2001

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CLUSTER ACTIVITIES AND NETWORK COMPONENTS

The Sustainable Building cluster is comprised of businesses and organizations that are part of the larger building industry. Understanding the Sustainable Building Cluster requires an assessment of more than those companies commonly referred to as "sustainable" or "green." While some firms focus primarily on Sustainable Building, many more participate in the cluster without identifying their work or products as sustainable.

Exhibit 2 provides an overview of the types of companies and organizations involved in Sustainable Building and the connections between them. The Sustainable Building Cluster is comprised of four over-arching types of activity, arranged from left to right on the cluster map: Production, Provision, Consumption, and Facilitation.

Producers are involved in the process of extracting, growing, or manufacturing building materials. Some producers generate materials by reclaiming them from existing structures or harvesting urban trees that would otherwise be chipped or landfilled. More sophisticated production involves manufacturing building materials from extracted raw materials. Paint, toilets, lumber, carpet, energy conserving HVAC systems and lighting fixtures are examples of products manufactured in this portion of the cluster.

Providers are distributors and suppliers of building materials; architects, designers, and engineers; builders; and sellers who connect finished buildings with end users. Distributors and suppliers receive their products from the Producers, and they in turn sell to builders. In some instances, builders buy directly from the Producers. Architects, designers, and engineers also provide services to the builders. Builders and sellers provide their services to the next broad category, the Consumers.

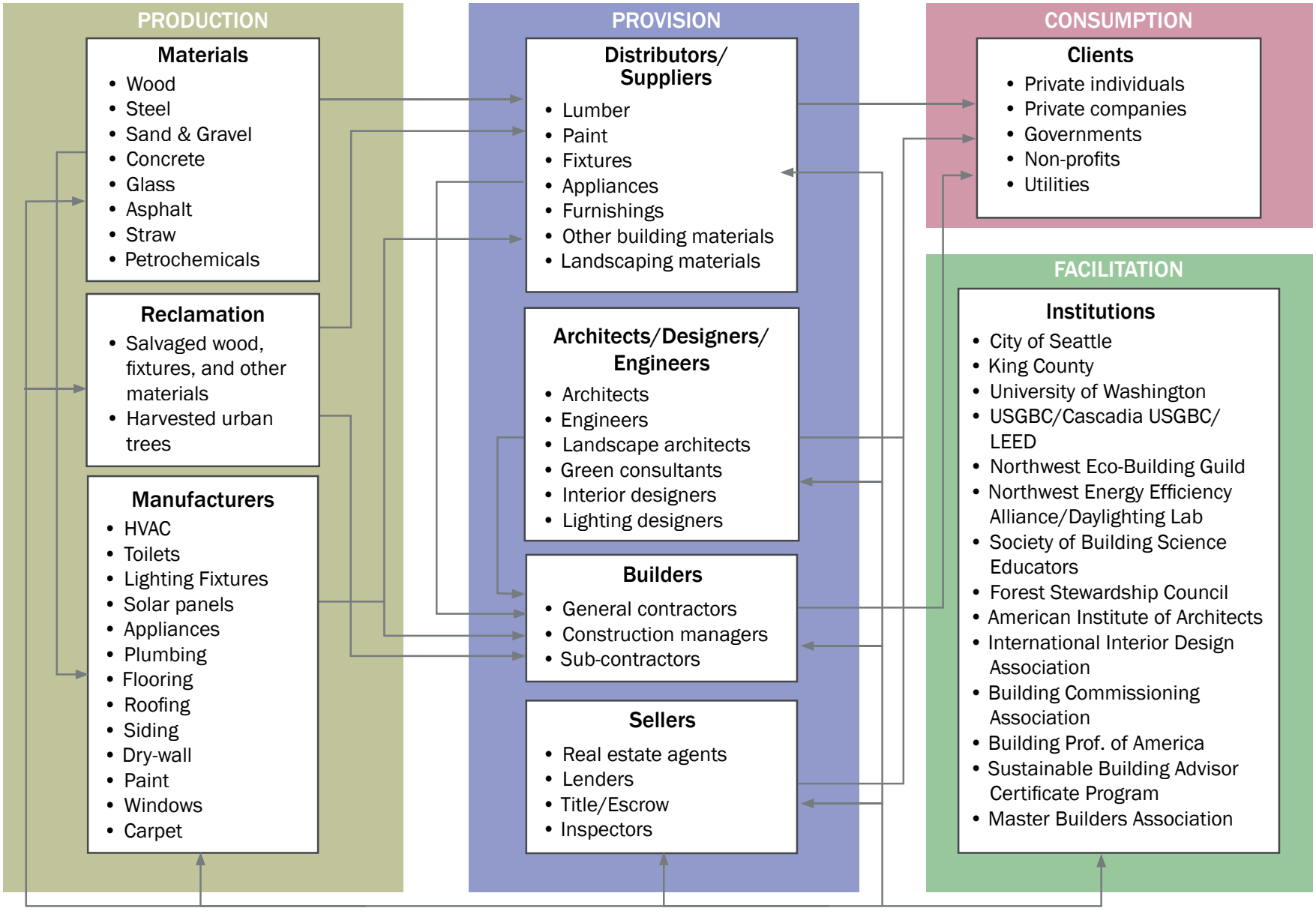
Consumers are the individuals, companies, governments, and non-profit organizations that purchase the finished buildings, construction/design services, and building materials from the Producers and Providers. In many instances Consumers also buy the services of sellers to find the finished products they seek.

Facilitators are the organizations and governments that regulate, innovate, and educate the other parts of the cluster. The organizations in this category generally engage in two-way relationships with the other categories, because their membership tends to include professionals engaged in Sustainable Building (for example, the United States Green Building Council and the Northwest Energy Efficiency Alliance).

Other entities in the Facilitators category focus a relatively small proportion of their attention on Sustainable Building, though a few have a large impact on the cluster due to their size or influence. For example, the City of Seattle and King County are large governments employing thousands of people, very few of whom work on Sustainable Building projects. Their policies requiring public buildings to meet sustainability guidelines, however, create impacts that ripple through the balance of the cluster.

Most activities included in the Sustainable Building Cluster are the same ones that take place in the larger building industry. However, several of the businesses and a few of the professions are specific to Sustainable Building. These activities include solar panel manufacturing, materials salvage, daylighting design and "green" consultants. Many of these activities are in the recycling, re-use, and building process portions of the cycle of materials diagram shown in Exhibit 1.

Exhibit 2:
Sustainable Building Cluster Map



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WHAT'S DRIVING THE TREND

Both nationally and in the City of Seattle there is a strong upward trend in Sustainable Building activity. One of the indicators of this trend is the number of projects that have been registered with the United States Green Building Council (USGBC) or have received one of the four certification levels for LEED™, the acronym for Leadership in Environmental and Energy Design.

LEED™ is an important indicator of the level of Sustainable Building activity, but it is not exhaustive. Many developers choose not to certify their buildings. In addition, a substantial amount of home renovation and remodeling incorporates sustainable products and methods not captured under the LEED™ system.

LEED™ Certification

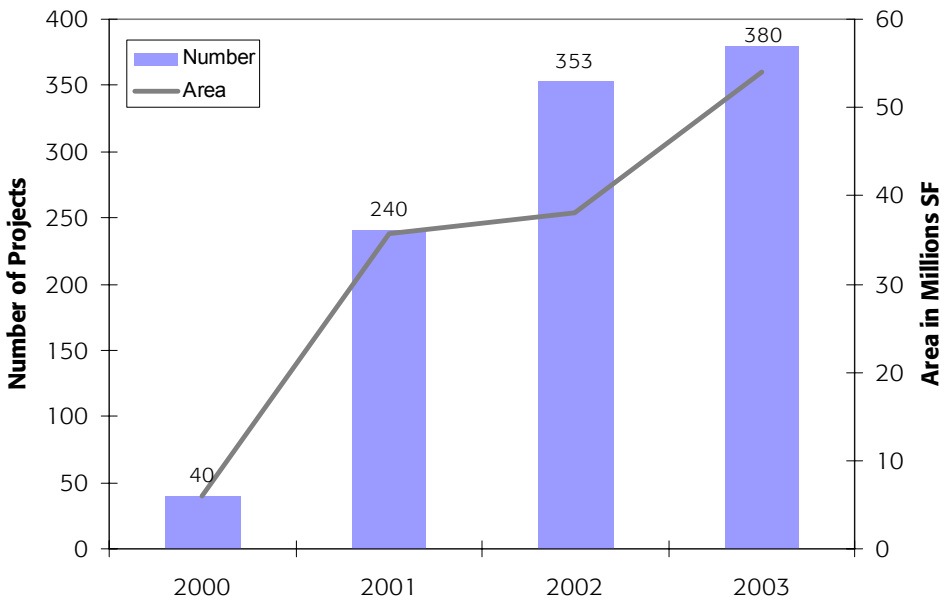
LEED™ was created by the United States Green Building Council, a non-profit organization based in Washington D.C. The Council defines LEED™ as "a voluntary, consensus-based national standard for developing high-performance, Sustainable Buildings." Over the past several years, LEED™ has become the standard third-party certification for Sustainable Building. The program covers a variety of building types, including new construction and major renovations, existing buildings, commercial interiors, and core and shell construction. Four levels of certification (Certified, Silver, Gold, and Platinum) rank buildings according to points awarded. There are five credit categories in which buildings can earn points.

To obtain LEED™ certification, a building developer must complete a four-step process consisting of project registration, technical support, third party review and building certification.

The number of LEED™ registered and certified buildings nationally has skyrocketed over the past four years. Exhibit 3 shows an increase from fewer than 50 projects in 2000 to nearly 400 projects per year in 2003, encompassing more than 50 million square feet of development.

Exhibit 3 presents the number of registered and certified projects in the U.S. from 2000-03. As the graphic shows, the number of such projects has increased at a tremendous rate of growth, rising by 83% from 2000 to 2001, by 32% from 2001 to 2002, and by 7% from 2002 to 2003. Moreover, as an industry and economic trend, Sustainable Building Cluster is in its infancy. Based on interviews conducted for this study and national building trends, rapid growth in Sustainable Building can be expected to continue at comparable rates for the foreseeable future.

Exhibit 3:
LEED™ Registered Projects in U.S. (2000-2003)



Source: www.BuildingGreen.com, 2004

The growth in the number of LEED™ buildings is due in large part to the recognition that certification can bring. The third-party certification grants validity to the claim of "sustainability." There is growing name recognition of LEED™, and certified buildings receive a certification plaque to display publicly on the building. Certified projects gain additional exposure through the USGBC web site, case studies and media announcements. Developers also seek certification to convey their environmental values to the community, their colleagues and their customers.

The growing national trend in LEED™ buildings is evident in Seattle and around Washington State. As shown in Exhibit 4, in year to date 2004, Seattle ranks second nationally in the number of LEED™ projects, just after Portland, Oregon. Similarly, Exhibit 5 shows that Washington State ranks third nationally in the number of LEED™ buildings. One of the big factors driving the relatively large number of LEED™ projects in Seattle and Washington are municipal public policies calling for Sustainable Buildings.

Exhibit 4:
LEED™ Registered Buildings by City (2004)

	Projects
Portland	42
Seattle	37
Chicago	37
Los Angeles	30
Pittsburgh	22
Atlanta	19
Grand Rapids	22
Austin	18
San Diego	17
Washington	17

Source: USGBC, November 2004

Exhibit 5:
LEED™ Registered Buildings by State, Top 10 States

	Buildings	Square Feet (M)
California	259	29.0
Pennsylvania	100	10.8
Washington	88	10.3
Oregon	82	8.0
New York	76	12.3
Massachusetts	66	8.4
Texas	61	7.2
Michigan	60	9.4
Illinois	58	9.9
Virginia	54	4.9

Source: USGBC 10/04

The U.S. Green Building Council also certifies professionals for competency in LEED™. Exhibit 6 shows the number of LEED™ Accredited Professionals (LAPs) by city. Seattle ranks first with 383, 100 more than the city with the next highest total, San Francisco. These numbers are current as of June, 2004 with many more professionals becoming accredited every month.

Exhibit 7 shows the results of an analysis conducted on more recent data regarding LAPs from the U.S. Green Building Council. Architects comprise the majority of Seattle LAPs with engineers coming in a distant second.

Exhibit 6:
LEED™ Accredited Professionals (LAPs) by City, 2004

CITY	# of LAPs
Seattle	383
San Francisco	283
Washington	258
Atlanta	223
Vancouver	215
Portland	214
New York	200
Chicago	194
Los Angeles	156
Boston	154
*As of June 2004	

Source: Cascadia Greenbuilder, July 2004

Exhibit 7:
Seattle LAPs by Type

	LAPs	Percent
Architect	284	59%
Consultant	27	6%
Contractor	21	5%
Developer	10	2%
Engineer	93	19%
Government	39	8%
Unknown	7	1%
Total	481	100%

Source: USGBC, Berk & Associates 2004

City of Seattle Building Policies

The City of Seattle's Sustainable Building Policy of 2000 establishes LEED™ Silver as the performance standard for all public buildings greater than 5,000 square feet in size. This policy was the first of its kind in the U.S., setting the bar high for other communities. Leadership by the City of Seattle has been very important; the City is a national leader in promoting green building through its Silver and Gold LEED™ projects. The City's green building team, Seattle Public Utilities and other initiatives demonstrate the City's commitment to Sustainable Building.

The policy served as a catalyst to grow the Sustainable Building industry in Seattle. By setting a LEED™ Silver policy, the City assisted the local building industry to learn to build sustainably and within available budgets. This industry knowledge has transferred to other public and private buildings.

The City of Seattle Sustainable building policy has led to 17 projects either completed under construction or in the design phase totaling over 2.8 million square feet and construction expenditures of $686.1 million, as shown in Exhibit 8.

As shown in Exhibit 9, Cascadia (defined here as Washington and Oregon) is home to just under 13% of all LEED™ buildings in the U.S. but comprises only 3% of the U.S. population.

Exhibit 8:
City of Seattle Sustainable Buildings/Projects

Building/Project Name	SF	Budget
Seattle Justice Center	300,000	$92.0M
Seattle City Hall	198,000	$72.0M
McCaw Performance Hall	295,000	$125.0M
Seattle Central Library	363,000	$162.0M
Southwest Precinct Building	30,000	$11.0M
Park 90/5 Building C	182,000	$31.0M
Seattle Municipal Tower	1,240,000	$33.0M
Cedar River Treatment Facility	4,800	$76.0M
Fisher Festival Pavilion	24,000	$9.3M
Joint Training Facility	55,000	$24.0M
Yesler Community Center	20,000	$7.0M
Northgate Community Center	20,000	$6.0M
Carkeek Park Environmental Learning Center	1,500	$0.8M
High Point Community Center	9,400	$37M
TOTAL	2,742,700	$686.1M

Source: City of Seattle

Exhibit 9:
LEED™ Buildings Nationally, Regionally, and in Seattle

	Nationally	Cascadia		Seattle	
Population (M)	290.81	9.69	3.3%	0.57	0.2%
Registered Buildings	1,448	188	13.0%	35	2.4%
Square Footage (M)	179.5	19.9	11.1%	4.9	2.7%
Capital Investment (B)	$35.9	$4.0	11.1%	$0.9	2.6%

Source: Seattle City Light, City of Portland Office of Sustainable Development, 2004

Greater Environmental Awareness

The strong growth in demand for sustainable development in the private sector reflects growing consumer interest in environmental protection and personal health. The Seattle public has been attentive to emerging housing and office alternatives.

Worker Health

Research suggests that indoor environmental quality of commercial buildings has a positive effect on workers' health. In some commercial buildings, pollutants inside can be 10 to 100 times higher than pollutants outside, according to a study conducted by the U.S. EPA in 2003. The 2003 Capital E report "The Costs and Financial Benefits of Green Buildings," commissioned by the California Sustainable BLOG Task Force, provides two case studies on the impacts of health benefits:

- William Pape, the co-founder of VeriFone, reports that eighteen months after VeriFone employees began working in a building retrofitted to cut indoor pollutants and improve indoor environmental quality, absenteeism rates were down 40% and productivity was up by more than 5%. Pape notes that healthy workplaces have "done more to boost productivity than all the bandwidth in the world."
- Gary Jay Saulson, the Senior VP and Director of Corporate Real Estate for PNC Realty Services, describes the benefits of the LEED™ Silver PNC Firstside Center building in Pittsburgh as follows: "people want to work here, even to the point of seeking employment just to work in our building. Absenteeism has decreased, productivity has increased, recruitment is better and turnover less." Two business units experienced 83% and 57% reductions in voluntary terminations after moving into the new Firstside facility.

Several studies document the improvements in worker productivity and health: Rocky Mountain Institute's *Greening the Building and the Bottom Line*, EPA's *Indoor Air Quality Database,* and the *Building Investment Decision Support (BIDS)* program at the Center for Building Performance at Carnegie Mellon University. William Fisk, head of the Indoor Environment Department at Lawrence Berkeley National Laboratory, conducted one of the most authoritative studies to date. His 2000 publication *Health and Productivity Gains from Better Indoor Environments* estimates potential national productivity gains from healthier workplaces to be $12 to $45 billion annually.

Increasing Costs of Non-renewable Resources

Another important factor generating increased interest in Sustainable Building is the long-term outlook for non-renewable resources. Many builders look to efficient designs and high-performance systems as the best new method of reducing energy use. Sustainable buildings are more efficient than conventional buildings and have substantially lower post-occupancy operating costs. For example, according to *The Costs and Financial Benefits of Green Buildings,* one public building in California, the Education Headquarters Building (LEED™ Gold) is saving taxpayers $500,000 per year in energy costs alone.

KEY FINDINGS FROM STAKEHOLDER INTERVIEWS

Key Findings from Stakeholder Interviews

Interviews played a critical role in this Sustainable Building Cluster study. We talked with 23 of the leaders in Sustainable Building in Seattle and asked them to share their thoughts on a range of topics, including their perspectives on recent and future growth in the industry, trends in consumer demand, the availability of Sustainable Building materials, and what the City can do to facilitate and encourage more Sustainable Building.

We interviewed developers, architects, engineers, institutional representatives, suppliers, contractors, paint companies and wood products manufacturers. A more extensive summary of interviews is included as Attachment A.

Recent and Future Growth

All respondents interviewed for this study described growth in demand for Sustainable Building over the past five years, and all expressed confidence that this trend would continue in the future. One respondent in particular referred to Everett Rogers' chart of the diffusion of innovations (shown in Exhibit 10) and estimated that in Seattle the Sustainable Building industry is just now approaching the "Early Majority" portion of the curve, which would suggest that Seattle can expect significant growth in the Sustainable Building industry in the near to mid-term future.

Exhibit 10:
The Rate of Adoption of Innovations

Source: Rogers, 1971

Another respondent's comments support this observation:

- The Sustainable Building industry has seen exponential, revolutionary growth. Business has grown, and the growth has been sustained during tough economic times.

Several respondents said that the industry has matured over the past five years, as both clients and professionals have gained experience and the concepts of sustainability and green building have become more mainstream.

- Sustainable Building has grown from an emerging industry in the 1990s to an established industry.
- Sustainable Building practices are now moving out to bigger companies at the corporate level, to companies that might not hold sustainability as a core value.

- The local market is growing and becoming more mainstream.
- Ten years ago there were a few pioneers, and now there is an established and growing industry.
- More clients demand better services, and a larger part of the building community is "going green." The building industry is conservative, but the green building movement is having an impact.
- People coming out of school are interested in green building. As the cost of green building decreases over time it will eventually become a matter of course. For example, contractors are already expecting to recycle materials.

Demand

Several respondents noted that private sector demand for sustainable office buildings is growing:

- The public sector in Seattle has led the green building trend, but the private sector is starting to catch up.
- The true revolution that happening now is the private sector is adopting green building goals and standards. This is based largely on the firms' values. Practical benefits and costs are considerations as well, such as productivity and particularly health. But primarily it is a firm's value system which drives it to create a green building. Stakeholders see this trend continuing in a strong transition right now.

Product Supply

The greatest difficulty noted by respondents was the available supply of green products, though the situation was described as much improved compared to even several years ago.

- Certified sustainable lumber is difficult to obtain and is still an emerging market.
- The biggest challenge is the supply of sustainable materials and tradespeople falling short of demand. One client had trouble finding materials that were affordable. Materials are becoming more affordable, but the trend needs to continue.
- Some products are not easily, regularly available: for instance wood flooring is not always available in a particular species.
- Many buyers stockpile for fear of shortages. Suppliers are small and unable to scale up to Home Depot or Lowe's level of sales.
- Stakeholders are investing in growing the market.

City of Seattle's Role: Praise and Recommendations

The City was widely applauded for its direct participation in growing the local Sustainable Building industry by mandating that new City buildings meet Silver LEED™ requirements. In addition to this creation of demand—with 17 public green buildings completed, under construction or in the design phase in four years—stakeholders appreciate the City for its role in promoting the benefits of green building and through education of consumers and the trade.

Stakeholders were asked to identify the top actions the City could take to encourage the growth of Sustainable Building in Seattle. Incentives were the most frequently recommended specific City-led actions to promote the industry.

The following points summarize key viewpoints:

- Tacoma's incentives encourage desirable development according to its economic development goals. Seattle could define green buildings as desirable development and create incentives to encourage it.
- The use of incentives should be expanded by the City, Bonneville Power Administration, and others. The City has improved its service orientation and now incentives are needed to "walk the talk."
- More incentives similar to the LEED™ incentives offered by the City through City Light and Seattle Public Utilities.
- Upzoning: increased floor-area-ratios (FARs), height and density should be allowed for green building.
- Additional incentive strategies should be implemented to minimize building footprints (including for zoning, height, and other dimensions).

Respondents also gave frequent and strong recommendations to expedite the permitting process for green buildings:

- Accelerate the SEPA and Master Use Permit (MUP) timeline for green buildings: go from 120 to 60 days and guarantee developers expedited permitting.
- Give "green lights to green projects," cutting permitting for green buildings by half.
- Provide fast-track building permits for green buildings.

Stakeholders advised the City to approach fostering Seattle's green building cluster from an economic development perspective:

- Seattle has a nucleus of important economic activity around green building. Professionals from Seattle are seen as national experts, and Seattle ranks with Portland and Vancouver in terms of being national centers of green building. This spurs economic development and provides important tax base and jobs.
- The environmental ethic is an important factor in creating an attractive city, which attracts workers. Also, the cost of resources from an infrastructure strategy perspective is an important element in attracting businesses: the key to the 21st Century will be getting more sustainable features for less money.
- There should be greater collaboration among Portland, Seattle and Vancouver. The City should expand its horizons, recognizing that together these three cities have a chance of becoming the Silicon Valley of the green building world: the center of innovation, financing, and other components. This will attract other firms here, just as high-tech firms need to be near Silicon Valley.

CASE STUDY: SEATTLE JUSTICE CENTER

This section presents a case study of the Seattle Justice Center to illustrate the specific efforts involved in Sustainable Building practices and how the different Cluster activities come together to participate in an individual project. The case study demonstrates the complexities of Sustainable Building, along with the challenges of specifying the economic role of local the industry as many of the materials and services are provided from outside the region..

The Seattle Justice Center was completed in 2002 as part of the City of Seattle Civic Center. The 14-story, 300,000 SF building houses the Municipal Court of Seattle and the Seattle Police headquarters. The building was certified LEED™ Silver and has won several awards, including the BEST (Businesses for an Environmentally Sustainable Tomorrow) Award in 2004 and an honorable mention from Buildings.com for Public/Government New Construction in 2003.

Total project budget and costs are shown in Exhibit 11. The Justice Center was one of the first buildings completed under the Sustainable Building policy, and the green premium for achieving LEED™ Silver is equivalent to 2.3% of the total project budget.

Exhibit 11:
Seattle Justice Center Overview

Total Project Budget	$91.35M
Budgeted Green Premium	$2.12M (2.3%)
Soft cost	$63 SF
Hard cost	$253 SF
Construction cost	$247 SF
Total square feet	300,000

Source: USGBC, City of Seattle 2004

The Justice Center incorporates several sustainable design features, including a double skin thermal buffer on the western glass curtainwall; a green roof covered with soil, grasses, and other plants; and a water harvesting system that collects rainwater and re-uses it for irrigation.

The sustainable materials used on the Justice Center include structural steel (90% recycled), acoustical ceiling tiles (66% recycled), glass tile (100% recycled) and glass terrazzo (100% recycled). Recycled concrete, recycled content carpeting, and. Forest Stewardship Council (FSC) certified wood were used in construction and for interior finishing. Low or no volatile organic compound (VOC) materials were used for all interior finishes. The contractor diverted 88.3% of construction waste using a combination of commingled and source-separated collection and diversion methods.

The Justice Center is an excellent example of how the Seattle Sustainable Building Cluster works in practice. Using the Cluster Map categories described above and detailed in Exhibit 2, the project team for the Justice Center breaks down as follows:

PRODUCTION

Reclamation: The contractor diverted 88.3% of construction waste using a combination of commingled and source-separated collection and diversion methods. Construction waste was diverted to local markets for recycling. Wood went to Rainier Wood, metals to Seattle Iron and Metals, cardboard to various fiber mills (both domestic and foreign), and concrete to Renton Concrete & Gypsum for recycling.

Manufacturers: Building automation systems were manufactured by Siemens Switzerland Ltd. HVAC systems were manufactured by Metalbestos (a subsidiary of Selkirk USA) of Dallas, Texas, Nailor of Toronto, Canada, Temtrol of Okarche, Oklamaha and Trane of Tyler, Texas. Plumbing was manufactured by Lochinvar of Lebanon, Tennessee.

PROJECT DESIGN AND CONSTRUCTION

Architects/Designers/Engineers: The design team was led by NBBJ of Seattle. Landscape architects were Gustafson Partners and Swift & Co. Landscape Architects, both of Seattle. The structural engineer was Skilling Ward Magnusson Barkshire (now known as Magnusson Klemencic Associates) of Seattle. The electrical engineer was Abacus Engineered Systems of Seattle. The civil engineer was SvR of Seattle. The geotechnical engineer was Shannon & Wilson of Seattle. The mechanical engineer was CDi Engineers of Lynnwood. Paladino and Co. (sustainable design consultant) led an eco-charrette and estimated initial green feature costs.

Builders: The general contractor was Hoffman construction of Seattle. The commissioning agent was Engineering Economics of Seattle.

CLIENT

Clients: The Client for the Justice Center was the City of Seattle and the Municipal Court of Seattle and the Seattle Police Department.

FACILITATION

Institutions: In this instance the Client was also one of the most important Institutions involved with the project. As the creator of the Sustainable Building policy, the permitting agency, the project manager, and the client, the City had a tremendous level of involvement with all aspects of the project. In addition to the City, important contributions to the project were made by the USGBC and the University of Washington Daylighting Lab.

The project team for the Seattle Justice Center is generally representative of the Sustainable Building Industry in Seattle. The Provision component of the team is almost entirely based in Seattle, and the sole exception is based in nearby Lynnwood. The Builders are also based in Seattle. The companies in the Reclamation category are not based in the City but are located within the larger Puget Sound region. Conversely, none of the manufacturers of the building systems are located in Seattle, the Puget Sound region, or even Washington state. As one respondent observed, "We have the buildings, but not the industry: the product manufacturers, which is where the real tax base is in terms of economic development. We want them to locate here and so we need to make it an attractive environment."

SUSTAINABLE BUILDING CLUSTER ECONOMIC ANALYSIS

Sustainable Building Measures

As shown in Exhibit 1, Sustainable Building is a portion of the entire building industry. A key challenge for this study is to estimate how much of the building industry economic activity relates to Sustainable Building. This section begins with several different measurements of the Sustainable Building industry, followed by an application of those measurements to estimate Sustainable Building activity.

Percentage of LEED™ Registered Buildings

The U.S. Green Building Council estimates, based on LEED™ registrations, that 3-4% of construction nationally is green building. This estimate is a conservative number because many buildings may have sustainable elements but do not seek certification.

Percentage of LEED™ Accredited Professionals

As discussed earlier and shown in Exhibit 6, Seattle ranks number one in LEED™ Accredited Professionals. The majority of these LAPs are architects, indicating a strong Sustainable Building presence in the design community.

Proportion of Commercial Buildings Utilizing the University of Washington's Daylighting Lab

Daylighting introduces natural light into buildings and minimizes artificial lighting requirements. This saves on energy and is an important source of LEED™ credits for buildings seeking certification. Effective daylighting can be complicated, however, particularly for large commercial structures.

A majority of the LEED-seeking commercial projects work with the University of Washington Daylighting Lab to design effective daylighting. Joel Loveland, the director of the lab, estimates that his lab helps with 10% of the commercial buildings in Seattle, and one-third of these seek LEED™ certification. This would suggest approximately 3% of all commercial buildings seek LEED™ certification.

Percentage of new homes certified under the Built Green program.

The Master Builders Association for King and Snohomish Counties (MBA-KS) measures the number of homes certified Built Green. As of September 2004, 17% of MBA-KS new homes constructed in King and Snohomish Counties were certified Built Green. According to Robin Rogers of MBA-KS, the majority of new homes certified Built Green were constructed outside the City of Seattle, but some residential contractors involved with Built Green construction are located within the City. Membership in Built Green has increased from four in 2000 to 200 in 2004.

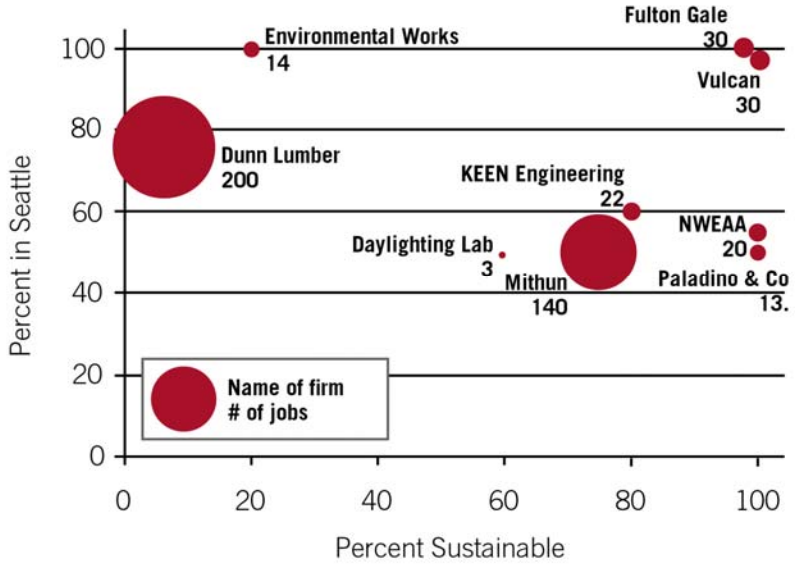
Percentage of Sustainable Activity by Firm

Stakeholders interviewed estimated the percentage of their business conducted in Seattle, the percentage of their business considered sustainable, and their number of employees. Exhibit 12 shows the sustainable percentage on the X-axis, the Seattle percentage on the Y-axis, and the size of the dot indicates the size of the firm. Most individuals interviewed work for firms primarily focused on Sustainable Building; similar percentages are likely to be lower for the balance of the Sustainable Building Cluster. However, the chart does indicate that several small to medium

and at least one large firm are doing most or all of their work on sustainable projects. Most of these firms conduct more than half of their business outside the City of Seattle, showing strong demand outside of the City for the Seattle-based Sustainable Building services and expertise.

A listing of firms known to participate in Sustainable Building is included in Attachment B, discussed in greater detail in the following section.

Exhibit 12:
Reported Percentages of Sustainable Building and Business Done in Seattle by Firm Size



Source: Berk & Associates, 2004

Sustainable Building Supplies

Sustainable Building supplies are an important part of both new construction and with renovations and remodels. Renovations and remodels have not been historically measured by LEED. The Environmental Home Center estimates that 10% of overall materials market includes sustainable materials.

Representatives from two paint companies with low VOC products and a representative of a large certified wood products company described the impacts of the growing demand for sustainable building supplies on their businesses. Ed Linton of Cloverdale Paint estimates that their low VOC EcoLogic product composes 10% of all paint sales. Ralph Nuxoll of Rodda Paint estimates that their Horizon product line comprises 3% of all paint sales, and also noted that Horizon is projected to hit 5% of sales next year.

Roseburg Forest Products supplies Forest Stewardship Council certified plywood to Home Depot and is the largest supplier of certified plywood in the U.S. Steve Gaeckle, the national account manager for certified products, estimates that the company's sustainable product line comprises 5-10% of their sales in Seattle. He notes that Seattle is one of their bigger markets and that the company has seen a 1,000% increase in certified wood sales over the past three years. He says LEED™ has been the primary driver of this marked increase.

Seattle Sustainable Building Revenues as a Portion of the Building Industry

Estimating the economic value of Seattle's Sustainable Building Cluster requires calculating two sets of data: (1) total gross revenues for cluster-related firms in Seattle; and (2) the percentage of revenues within each activity associated within Sustainable Building. This section provides building industry-wide data that serve as a foundation for Sustainable Building analysis, along with descriptions of how the Sustainable portion of the building industry was estimated.

A preliminary analysis was required, however, to match the Standard Industrial Classification (SICs) used to report revenues and employment data to the Cluster activities identified in Exhibit 2. Detailed industry codes (4-digit SICs) were chosen based on a review of the companies included within each code. The detailed SICs were then summarized into the categories presented in the tables that follow in this section. The categories are *not* inclusive of all 4-digit SICs typically included. Detailed tables showing the 4-digit SICs included in each category and the associated calculations are shown in Attachment C.

Seattle Building-Related Revenues

Gross business revenues are reported to the State Department of Revenue and summarized only Statewide. Businesses are not required to report gross revenues for each City in which they have employees or do business. Estimates based on related business activity must be used to estimate local revenues.

Exhibit 13:
Statewide Building Industry Gross Revenues and Seattle Share by 2-Digit SIC, 2003 (2003 Dollars)

	Statewide Gross Revenues	% of Industry in Seattle	Estimated Seattle Gross Revenue, 2003
Agricultural Services	922,136,413	16%	144,377,542
General Building Contractors	10,557,837,231	23%	2,426,671,720
Special Trade Contractors	12,403,910,693	14%	1,789,839,530
Stone, Clay and Glass Products	1,092,754,513	17%	189,064,611
Primary Metal Industries	628,110,875	56%	350,824,221
Wholesale Trade Durable Goods	6,434,253,507	18%	1,181,050,498
Building Materials & Garden Supplies	7,279,704,986	9%	620,137,178
Real Estate	2,956,120,023	36%	1,054,884,012
Engineering & Management Services	4,194,734,818	26%	1,084,499,475
Total	**46,469,563,059**	**19%**	**8,841,348,788**

Source: Washington State Department of Revenue and Employment Security Department.

For this analysis, wages paid by employers within the City, reported to the State, provide an acceptable means to allocate Statewide revenues within each sector, shown in Exhibit 13. Using wages to determine the percentage of Statewide industry revenues based in Seattle suggests that $8.8 billion, or 19%, of the State's $46.5 billion building industry is based in Seattle.

Sustainable Building Portion of the Building Industry

Baseline Assumptions and Methodology. The previous data referenced in this report include data readily available for analysis and distribution. The key challenge to analyzing the economic value of Sustainable Building comes in isolating economic activity directly associated with Sustainable Building. For this study, this has been accomplished by estimating the percentage of the overall building industry associated with Sustainable Building.

Metrics identified previously in this report (percentage share of LEED™-Certified commercial buildings and others) provide a basis and a point of departure for estimating the Sustainable Building portion of the building industry within each related activity. Currently 3% of nationwide commercial building activity includes LEED™-Certification. Calling all building activity Sustainable only because it is associated with a LEED™-Certified building may not be entirely accurate, but there is a case to be made that all activity related to a sustainable project should "count" as part of the Sustainable Building industry. For the purposes of this report, the 3% LEED™ metric serves as an adequate minimum assumption for the Sustainable portion of the entire building industry, for all activities, shown in Exhibit 14.

In all segments of the construction industry, stakeholders and business leaders reported that many Sustainable Building activities occur without certification or formal recognition. Therefore, the

Exhibit 14:
Estimated Sustainable Share for the Building Industry

	Percent Sustainable		
	Low	**Mid-Point**	**High**
Agricultural Services	6%	8%	10%
General Building Contractors	3%	8%	13%
Special Trade Contractors	3%	7%	10%
Stone, Clay and Glass Products	3%	7%	10%
Primary Metal Industries	3%	7%	10%
Wholesale Trade Durable Goods	3%	7%	10%
Building Materials & Garden Supplies	3%	7%	10%
Real Estate	3%	7%	10%
Engineering & Management Services	7%	12%	17%
Total Cluster Activities	4%	8%	12%

Source: Berk & Associates Interviews of Industry Stakeholders

percentage of the entire building industry devoted to Sustainable Building is likely much greater than 3%. Unfortunately, few other metrics help define an upper end to baseline estimates. As noted earlier, in King County 17% of new residential homes are built in Sustainable Building practices (through the Built Green program). Residential, however, is only a portion of the building industry, and most of the Built Green homes are built outside of Seattle, so 17% is likely too high to utilize as a "high-end" estimate for the baseline range. Our stakeholder interviews provide the only means to define the upper end of the baseline range. In most cases, when pressed for "how much," stakeholders either avoided an estimate altogether, or provided speculation of no more than 10%. Therefore, 10% stands as the starting point for a baseline high estimate.

The low-end estimate of 3% and high-end estimate of 10% serve as a baseline estimate of the percentage of the entire building industry associated with the Sustainable Building Cluster. Other percentages that influence the baseline rates were the building supply retailers (low VOC paints ranging 3% - 10% of all sales), Forest Stewardship Council (FSC) certified wood (5% - 10% of all sales), and Environmental Home Center estimates of the overall sustainable materials market (10% of all sales).

Adjustments Based on Specific Cluster Activity. In a few cases, stakeholders provided more detailed information about their profession and their niche within the industry to depart from the default assumptions, reflected in a few instances in Exhibit 14. Architectural and other design professions appear to lead the Sustainable Building industry in Seattle, based on interviews of industry stakeholders. These professions tend to have the highest participation and representation in Sustainable Building organizations and tend to do more of their work on sustainable projects relative to the other professions in the Cluster. The engineering professions rank second, followed by contractors and developers.

In other cases, an unusually strong local concentration of businesses leads to a higher assumption than the baseline rates, since the baseline rates reflect national trends.

Finally, the percentage of Sustainable was estimated for each detailed (4-digit) SIC (See Attachment C for details). Assumptions for each 2-digit Cluster grouping shown in Exhibit 14 were then calculated, weighted according to building-industry wide revenues. The results are shown in Exhibit 14, resulting in the Cluster-wide total estimate that 4% to 12% of all building-industry activity included is Sustainable Building.

Within each sector, the following findings informed the range of percentages assumed Sustainable within the construction and building industry:

- **Agricultural Services: 6% to 10%.** Agricultural Services comprises Landscape Counseling and Planning, Lawn and Garden Services, and Ornamental Shrub and Tree Services. Seattle is home to only 16% of agricultural services statewide, but 66% of the state's landscape counseling and planning businesses are located within the City. This higher concentration suggests 6% Sustainability at a minimum.

- **General Building Contractors: 3% to 13%.** General Building Contractors comprises General Contractors for Single Family Houses, Other Residential Buildings, Operative Builders, Industrial Buildings and Warehouses, and Nonresidential Buildings, Other than Industrial Buildings and Warehouses.

All General Building Contractors were assigned the background rate with the exception of nonresidential contractors, which were given an upper range of 15%; this specialty area drives up the upper end of all General Building Contractors to 13%. This increase is based on information from the Daylighting Lab and commercial developers interviewed for this study who reported doing work outside of the City of Seattle. Additionally, 31% of these contractors are based in Seattle, reinforcing many interviewees' perception that there is a critical mass of sustainable building expertise in the commercial contracting segment of the Seattle building industry.

- **Special Trade Contractors: 3% to 10%.** Special Trade Contractors comprises seventeen categories, including plumbing, painting, electrical work, masonry, carpentry, glazing, and several others (a complete listing is available in Appendix B). All Special Trade Contractors were assigned the Cluster-wide rate, with one exception: Wrecking and Demolition. Wrecking and Demolition work was given an upper range of 15%, primarily because of local companies such as the RE Store, Second Use, Earthwise and Seattle Building Salvage. When taken into consideration with other Special Trade Contractors and weighted by industry-wide revenues, this exception did not change the baseline rates.

- **Stone, Clay and Glass Products: 3% to 10%.** The Stone, Clay and Glass Products Major Group comprises eleven categories ranging from flat glass and ceramic tile to ready-mixed concrete and gypsum products. All Stone, Clay and Glass Products were assigned the baseline rates, with two exceptions. Flat glass and ceramic wall and floor tile were given upper ranges of 12%, primarily because of the local presence of companies such as Bedrock Industries, Eco Coatings, and TriVitro.

- **Primary Metal Industries: 3% to 10%.** The Primary Metal Industries Major Group is comprised of nine categories including steel works, electrometallurgical products, iron foundries, and steel pipe and tubes. All of the industries in this group were assigned the baseline rate.

- **Wholesale Trade Durable Goods: 3% to 10%.** The Wholesale Trade Durable Goods Major Group is comprised of eleven categories including lumber, brick, roofing, and HVAC equipment. All of the industries in this group were assigned the baseline rate.

- **Building Materials and Garden Supplies: 3% to 10%.** The Building Materials and Garden Supplies Major Group is comprised of lumber and other building materials dealers, paint, glass and wallpaper stores, hardware stores, and retail nurseries and lawn and garden supply stores. All suppliers in this group were assigned the baseline rate except nurseries and garden supply stores, which were assigned an upper range of 12.0% due to the high percentage of sustainable products sold at these establishments.

- **Real Estate: 3% to 10%**. The Real Estate Major Group is comprised of real estate agents and managers and land sub-dividers and developers. Both of these categories were assigned the baseline rate.

- **Engineering and Management Services: 7% to 17%.** The Engineering and Management Services Major Group is comprised of engineering services, architectural services and surveying services. This group contains many of the businesses that are actively involved in sustainable building. Based on the level of sustainable building activity reported by interviewees from engineering and architectural firms and research into the number of LEED™ Accredited Professionals, the range for engineers was set at 5 – 10% and the range for architects was set at 10% – 20%. Surveying services were assigned the baseline rate.

Sustainable Building Total Revenues

Multiplying the estimated gross revenues shown in Exhibit 13 by the Sustainable Building shares shown in Exhibit 14 yields estimates of the total revenues associated with Sustainable Building Cluster activity in Seattle, shown in Exhibit 15. The low estimate of the Gross Revenues of the Sustainable Building Cluster in Seattle is $316.8 million, or 4% of the building industry as a whole. The high estimate is $1.0 billion, or 12% of the building industry as a whole. (The mid-point of the range is $671.8 million.)

Exhibit 15:
Estimated Gross Revenues for the
Seattle Sustainable Building Cluster, 2003 (2003 Dollars)

	Low	Low %	Midpoint	Midpt %	High	High %
Agricultural Services	8,770,450	6%	11,964,108	8%	15,157,766	10%
General Building Contractors	72,800,152	3%	188,173,162	8%	303,546,172	13%
Special Trade Contractors	53,695,186	3%	117,133,203	7%	180,571,220	10%
Stone, Clay and Glass Products	5,671,938	3%	12,375,334	7%	19,078,730	10%
Primary Metal Industries	10,524,727	3%	22,803,574	7%	35,082,422	10%
Wholesale Trade Durable Goods	35,431,515	3%	76,768,282	7%	118,105,050	10%
Building Materials & Garden Supplies	18,604,115	3%	40,639,499	7%	62,674,882	10%
Real Estate	31,646,520	3%	68,567,461	7%	105,488,401	10%
Engineering & Management Services	79,631,807	7%	133,406,191	12%	187,180,576	17%
Total	**316,776,410**	**4%**	**671,830,814**	**8%**	**1,026,885,218**	**12%**

Source: Berk & Associates Estimates based on data from Washington State Department of Revenue, Employment Security Department and Stakeholder Interviews.

Taxable Retail Sales and Sales Tax Revenues

Data for City revenues subject to sale and use tax come from the City of Seattle, as shown in Exhibit 16. Since sales and use taxes do not always accrue to the jurisdiction in which a business is based, it is not possible to say what portion of local sales tax revenues were generated by businesses based in Seattle. Revenues estimated in Exhibit 16 reflect allocation of the local component of the sales and use tax (0.85%).

More than 80% of the sales tax revenues generated by Sustainable Building activity in Seattle comes from contractors, including General Building Contractors and Special Trade Contractors combined (between $614,000 and $2.4 million in 2002 – a subset of the $906,000 to $2.9 million shown below). Retailers and Wholesalers combined to provide $104,000 to $349,000 in sales tax from Sustainable Building products.

Exhibit 16:
Sustainable Building Cluster Taxable Retail Sales and Sales Tax Revenue Estimates, 2002 (2002 Dollars)

	Building Activity Total Taxable Retail Sales	City of Seattle Sales Tax Revenue	Sustainable Building Cluster Revenues		
			Low	Midpoint	High
Agricultural Services	$73,617,166	$625,746	$38,012	$51,854	$65,695
General Building Contractors	$1,736,888,097	$14,763,549	$442,906	$1,144,821	$1,846,735
Special Trade Contractors	$671,608,556	$5,708,673	$171,260	$373,595	$575,930
Stone, Clay and Glass Products	$4,404,615	$37,439	$1,123	$2,451	$3,778
Primary Metal Industries	$3,412,844	$29,009	$870	$1,886	$2,901
Wholesale Trade Durable Goods	$117,929,971	$1,002,405	$30,072	$65,156	$100,240
Building Materials & Garden Supplies	$290,117,108	$2,465,995	$73,980	$161,604	$249,229
Real Estate	$48,834,095	$415,090	$12,453	$26,981	$41,509
Engineering & Management Services	$28,656,557	$243,581	$17,885	$29,963	$42,041
Total Cluster Activity	**$2,975,469,009**	**$25,291,487**	**$906,168**	**$1,858,310**	**$2,937,499**

Source: Washington State Department of Revenue, Berk Estimates of Cluster Share

Business & Occupations Tax

The City of Seattle reports Business and Occupations (B&O) tax receipts for the City's building-related activities to total $18.1 million in 2002, as shown in Exhibit 17. The estimates of the Sustainable Building activity as a percentage of all building activity (Exhibit 14) suggest City B&O receipts associated with Sustainable Building between $649,000 and $2.1 million in 2002.

B&O tax receipts are reflective of the construction activity occurring within the City, based on the location of the new construction – *not* based on the home office of the jobs required to do the work. For example, the City of Seattle receives B&O taxes when a Tacoma construction company builds a new building in Seattle. The City of Seattle does not receive B&O taxes when a Seattle-based construction firm does work in Tacoma. The implication of this distinction is that B&O tax receipts are more directly affected by City policies that encourage Sustainable Building within the City, as opposed to City policies that target increased employment in the Cluster based in the City.

Exhibit 17:
Seattle Sustainable Building Cluster
Business & Occupation Tax Receipts, 2002 (2002 Dollars)

	Building Activity Total B&O Tax Revenue	Sustainable Building Cluster Revenues		
		Low	Midpoint	High
Agricultural Services	$280,525	$17,041	$23,246	$29,451
General Building Contractors	$4,816,824	$144,505	$373,515	$602,524
Special Trade Contractors	$4,006,555	$120,197	$262,203	$404,209
Stone, Clay and Glass Products	$298,528	$8,956	$19,540	$30,125
Primary Metal Industries	$658,767	$19,763	$42,820	$65,877
Wholesale Trade Durable Goods	$1,440,797	$43,224	$93,652	$144,080
Building Materials & Garden Supplies	$970,537	$29,116	$63,602	$98,088
Real Estate	$1,886,387	$56,592	$122,615	$188,639
Engineering & Management Services	$3,754,440	$275,678	$461,840	$648,002
Total Cluster Activity	**$18,113,361**	**$648,983**	**$1,463,033**	**$2,103,790**

Source: City of Seattle, Berk Estimates of Cluster Share

Companies

As repeated throughout this study, the Sustainable Building Cluster is defined largely by the entire building and construction industry. This is most evident when attempting to identify the companies and firms engaged in Sustainable Building. The shares of Sustainable Building within the entire building industry no longer apply to estimating firms and establishments participating in the Sustainable Building Cluster.

Data describing the entire building cluster are relevant for identifying the breadth of the number of companies participating in Sustainable Building. Nearly 34,000 companies participate in the building and construction industry in Seattle, all of which are likely affected and participate in some way in Sustainable Building.

Interviews conducted for this study covered the important task of identifying firms with a very clear presence in the Cluster. More than 230 firms were identified, listed by name and relevance in Attachment B. Many firms are known leaders in the Cluster, identified by their registration with Sustainable Building associations. Others were referenced by their peers and identified through research as participating in the Cluster.

Jobs and Wages

The estimates of City jobs in each industry shown in Exhibit 18 are based on summaries of State Employment Security Department (ESD) data for the first quarter of 2002. The estimated portions of economic activity in the building industry associated with the Sustainable Building Cluster (Exhibit 14), suggest that the equivalent of between 1,370 and 4,160 jobs in Seattle can be directly associated with Sustainable Building.

Exhibit 18:
Seattle Sustainable Building Cluster Estimated Jobs, 2002 (2002 Dollars)

	Building Activity Jobs	Sustainable Building Cluster Jobs Estimates		
		Low	Midpt	High
Agricultural Services	1,036	63	86	109
General Building Contractors	6,402	192	496	801
Special Trade Contractors	9,153	275	599	923
Stone, Clay and Glass Products	570	17	37	58
Primary Metal Industries	674	20	44	67
Wholesale Trade Durable Goods	3,632	109	236	363
Building Materials & Garden Supplies	1,641	49	108	166
Real Estate	5,330	160	346	533
Engineering & Management Services	6,596	484	811	1,138
Total Cluster Activity	**35,034**	**1,369**	**2,764**	**4,158**

Source: Puget Sound Regional Council, Washington State Employment Security Department

The estimated of jobs associated with the Cluster would be job equivalents, reflecting how many people working in Sustainable Building work on traditional building projects as well.

The estimates of wages paid to Seattle jobs based on Sustainable Building are shown in Exhibit 19, based on summaries of ESD data for the first quarter of 2002. The estimated portions of economic activity in the building industry associated with the Sustainable Building Cluster shown in the Exhibit, suggest that between $60.2 million and $195.2 million in wages are paid annually based on Sustainable Building activity.

Exhibit 19:
Seattle Sustainable Building Cluster Estimated Wages Paid, 2002 (2002 Dollars)

	Building Activity Wages (000s)	Sustainable Building Cluster Wages Estimates (000s)		
		Low	Midpoint	High
Agricultural Services	$27,024	$1,642	$2,239	$2,837
General Building Contractors	$344,167	$10,325	$26,688	$43,051
Special Trade Contractors	$443,404	$13,302	$29,018	$44,734
Stone, Clay and Glass Products	$29,010	$870	$1,899	$2,927
Primary Metal Industries	$28,246	$847	$1,836	$2,825
Wholesale Trade Durable Goods	$165,736	$4,972	$10,773	$16,574
Building Materials & Garden Supplies	$44,716	$1,341	$2,930	$4,519
Real Estate	$233,927	$7,018	$15,205	$23,393
Engineering & Management Services	$364,102	$26,735	$44,789	$62,843
Total Cluster Activity	**$1,680,331**	**$60,205**	**$135,377**	**$195,163**

Source: Puget Sound Regional Council, Washington State Employment Security Department

POLICIES TO ENCOURAGE SUSTAINABLE BUILDING

Several policy recommendations have been brought forth through stakeholder interviews and similar research conducted recently in coordination with the City (by University of Washington graduate student Carrie Dolwick in June, 2004). In addition, the City of Portland's Green Investment Fund Program offers an example of an incentive program, appropriate for the City of Seattle's consideration.

For commercial buildings, the City of Seattle currently offers a LEED™ incentive which requires the project to become certified and for the developer to conduct an early design charette. The dollar value of the incentive is $15,000 for a certified building and $20,000 for a LEED™ Silver rank. The incentive fund to date has provided more than $360,000 to 22 projects with more than 2.3 million square feet.

The City also provides energy and water conservation incentives to building owners. Multifamily Conservation and Built Smart are the largest residential programs. For commercial buildings, Energy Smart Design and Services, the Lighting Design Lab, Smart Business Rebate Program, Energy Savings Plan and the Sustainability and Energy Code all work to encourage Sustainable Building.

Key industry stakeholders indicate that incentives are a welcome addition to the City's Sustainable Building policies, but they feel more incentives are necessary to promote the industry. One such program is Portland's Green Investment Program Fund.

Portland's Green Investment Program

The Green Investment Fund (GIF) is administered by the City of Portland Office of Sustainable Development. Since February of 2001 the GIF has funded 74 projects (including 12 LEED™ buildings) totaling over 2 million SF. Projects include commercial structures, residential development and affordable housing. The fund also supports emerging technologies such as ground source heating and cooling, rainwater harvesting, on-site water management, and green roof monitoring systems. The proposed 2004-2009 budget for the GIF is $2.5M and will be allocated as shown in Exhibit 20.

The Business Energy Tax Credit (BETC) offered by the Oregon Department of Energy is another example of a Sustainable Building incentive package that might be applicable in Seattle. BETC offers projects that incorporate energy conservation, efficient equipment and renewable energy systems a 35%, five-year tax credit (as shown in Exhibit 21) or a 28% cash "pass through" option.

Exhibit 20:
City of Portland Office of Sustainable Development
Green Investment Fund 2004-2009

Expenditures	
Administration	$300,000
Design Services	$500,000
Emerging Technologies	$1,200,000
Monitoring and Verification	$400,000
Research	$100,000
TOTAL	$2,500,000
Funding	
Office of Sustainable Development	$250,000
Bureau of Environmental Services	$1,125,000
Water Bureau	$375,000
Energy Trust of Oregon	$750,000
TOTAL	$2,500,000

Source: City of Portland Office of Sustainable Development, 2004

Exhibit 21:
Oregon Department of Energy Business Energy Tax Credit (BETC) per Gross Square Foot

	Targeted LEED Rating		
Building Size	**Silver**	**Gold**	**Platinum**
First 10,000 gsf	$5.71	$9.29	$14.29
Next 40,000 gsf	$3.57	$4.29	$7.86
Above 50,000 gsf	$2.00	$2.86	$5.71

Source: City of Portland Office of Sustainable Development, 2004

Eligible businesses take the credit over five years: 10 percent in the first and second years and 5 percent each year thereafter. If they cannot take the full tax credit each year, they can carry the unused credit forward up to eight years. Those with eligible project costs of $20,000 or less may take the tax credit in one year. The tax credit can cover all costs directly related to the project, including equipment cost, engineering and design fees, materials, supplies and installation costs. Loan fees and permit costs also may be claimed. Office buildings, stores, apartment buildings and other businesses may be eligible.

Recommendations

Policy recommendations brought forth by City staff based on this report, stakeholder interviews and other City research include the following:

- Develop a City-wide sustainable building policy for private developers that will encourage the design and construction of sustainable buildings
- Provide incentives for sustainable building projects, such as increased floor-area-ratios, height, and density bonuses
- Maintain and expand the City's LEED™ and BuiltGreen incentive programs.

Creating Markets

- Actively encourage product suppliers to locate in Seattle
- Host national and regional conferences on sustainable building and encourage National Sustainable Building associations to locate in Seattle

Permitting

- Accelerate the SEPA and Master Use Permit timeline for sustainable buildings and guarantee developers expedited permitting
- Provide fast-track building permits for sustainable buildings
- Reduce costs charged by the City to Sustainable Building businesses (e.g., permitting, recycling, and waste fees)

Technical Assistance/Education

- Support the creation of the Sustainable Development Center
- Continue to develop case studies for City LEED™ projects
- Support the development of materials for home remodeling projects and conduct trainings in local libraries
- Work with groups such as the Cascadia Chapter of the Green Building Council and the Urban Land Institute to conduct workshops, trainings, and lectures on sustainable building
- Work with the University of Washington and other local training institutions to advance curricula related to sustainable practices

CONCLUSION

The Importance of Sustainable Building in the City of Seattle

The City of Seattle has a strong and growing Sustainable Building Cluster. Sustainable Building as an industry and economic activity appears to be maturing out of its infancy and growing into a more common practice within the on-going building and construction industry. Sustainable Building practices that once may have been pursued by special interests and a passion for environmental concerns are now becoming mainstream building techniques, supported by both public policy and private-sector interests. By establishing LEED™ Silver as the performance standard for municipal buildings, the City demonstrated the importance of public policy and catalyzed substantial and rapid growth in the Cluster.

As Sustainable Building activity increases, the Sustainable Building Cluster generates municipal revenues. The Cluster is currently estimated to generate between $316.8 million and $1 billion dollars in revenues annually and provide between 1,370 and 4,160 jobs, directly engaged in Sustainable Building. In Seattle, Sustainable Building activity generates between $900,000 and $2.9 million annually in sales tax revenues, along with $650,000 to $2.1 million annually in Business & Occupations (B&O) Tax revenues, for a total of $1.6 million to $5.0 million annually in City revenues from these two sources. Much of the municipal revenue might otherwise come from traditional building practices, though some portion likely comes from Sustainable Building activity that might not have been replaced by traditional practices.

The high degree of Sustainable Building expertise in the design, engineering and construction professions makes Seattle a nationally and internationally recognized leader. Seattle is home to the largest concentration of LEED™ Accredited Professionals. Organizations such as the Lighting Design Lab, University of Washington Daylighting Lab, Better Bricks, and the Cascadia Chapter of the U.S. Green Building Council are fostering innovation in Sustainable Building methods and technologies. Many of the professionals in the Cluster earn relatively high wages and continued growth in the field is expected over the next several years.

The concentration of the design professions is an opportunity to build on this expertise to increase the size and economic value of the Sustainable Building Cluster. As continued population and employment growth lead to new construction and remodeling, Sustainable Building practices will grow as well.

Public policy can play an important role in fostering the growth of this industry and advancing the states of the art and the practice in Sustainable Building. The City's policy for municipal buildings achieving LEED™ Silver is widely acknowledged among the best examples of how public policy can encourage growth within the Cluster. Additional actions identified and encouraged by stakeholders include more coordination and collaboration with the City's many organizations and practitioners of Sustainable Building, complemented by policies that reduce costs for companies that pursue Sustainable Building.

ATTACHMENT A
SUSTAINABLE BUILDING CLUSTER ANALYSIS
SUMMARY OF STAKEHOLDER INTERVIEWS

KEY FINDINGS

Phone interviews were conducted with 14 stakeholders in June, July and August, 2004. Key Themes are listed below, with a more detailed summary of responses on the following pages.

Recent and Future Growth. All respondents described growth in demand for sustainable building over the past five years, and all expressed confidence that this trend would continue in the future. The industry was described as maturing and becoming more mainstream, on both the demand and supply sides of the equation.

Demand. Increasing interest in green building was described as tied values – both personal and corporate – and to practical benefits. Some respondents noted that green products had to compete in terms of performance and quality first, with environmental benefits considered by many to be a bonus. Perceived health benefits were described as having most currency with consumers.

Supply. Seattle was described as an established center for sustainability in general and sustainable building in particular. This clustering of firms and experts benefits the industry by providing a ready supply of capable professionals and a comparatively less constrained supply of green building materials. Seattle was described as having a strong and generally cooperative network green building professionals. Competition was described as limited to Pacific Northwest firms, though increasing competition was noted between private firms and not-for-profits, and between large and small firms.

The City of Seattle's Role. The City was widely applauded for its direct participation in growing the local sustainable building industry by mandating that new City buildings meet Silver LEED requirements. In addition to this important creation of demand, with 17 public green buildings being constructed in a short period of time, the City was appreciated for its roles in promoting the benefits of green building and through education of consumers and the trade.

Seattle was also criticized by some for creating an inflexible and difficult environment to build in, with no special accommodation or incentive for sustainable buildings. The most common recommendation for expanding the City's role in growing the industry was by implementing incentives that allow greater density, height, and floor area ratios (FARs) for green buildings, as well as by expediting permitting. The City was encouraged to approach enhancement of the industry through the lens of economic development, encouraging more clustering of firms and labor and cooperating with Vancouver and Portland to establish the Pacific Northwest as the national leader in green building.

INTRODUCTION

Background

This document is a summary of findings from telephone interviews conducted to learn about Seattle's Sustainable Building Cluster. Interviewees included 14 stakeholders contacted during June, July and August, 2004. Stakeholders represented a wide range of perspectives on the sustainable building industry, including stakeholders from each of the sectors below:

- Architects/Designers/Engineers
- Contractors/Consultants
- Developers
- Suppliers
- Institutions

Appendix A shows a complete list of individuals interviewed and Appendix B contains the interview protocol used during discussions.

Interviews began with an overview of the purpose of the study:

1. Determine the sustainable building cluster definition
2. Estimate cluster activity and trends through number of firms, revenue, jobs and average wages and Seattle Specific Indicators
3. Create a list of recommendations for the City to consider

The interviewer then read the following definition of sustainable building:

> *Sustainable buildings are water and energy efficient, minimize waste, maximize use of recycled content materials, create healthy indoor environments for workers, employ resource efficient materials and incorporate environmentally sensitive site planning. This term is often used interchangeably with "green building."*

The interviewer noted that the study would not employ a precise or rigid definition of what qualifies as a "green" or "sustainable" building, suggesting the interviewee should be comfortable using the definition that made the most sense to him or her.

Organization of this Report

The summary of stakeholder responses is organized in the following sections:

I. Industry Outlook and Trends
II. Sustainable Building in Seattle
III. The Makeup of Seattle's Sustainable building Cluster
IV. Measuring Sustainable Building-Related Economic Activity in Seattle
V. Business Profile

Each section is organized by the related questions asked of stakeholders, with the questions posed presented in the boxes preceding the findings.

I. INDUSTRY OUTLOOK AND TRENDS

Have you seen growth in demand for sustainable building in the last 5 years?

What are the key issues affecting the growth or decline of the sustainable building industry? How do you see the industry changing over the next five years?

A Growing and Maturing Industry

All individuals interviewed stated that demand for sustainable building has grown over the past five years. Firms that work in this field reported increases in revenues, and a number of respondents pointed to increases in the number of LEED certified professionals, LEED projects, Built Green projects, and the like.

Some respondents noted that green building still constitutes a small fraction of the total industry, and one said, "People are paying attention, but we're coming out of a down economy, so it's hard to tell level of commitment."

This respondent's comments were similar to many:

- We've seen exponential, revolutionary growth. Our practice has grown, and the growth has been sustained during tough economic times.

Several respondents characterized a maturation in the industry over the past five years, as both clients and professionals gain experience and the concepts of sustainability and green building become more mainstream:

- We've gone from a nascent industry in the 1990s to an established industry.
- It's now moving out to bigger companies at the corporate level, to companies that might not have sustainability as a core value.
- The market locally is growing and becoming more mainstream.
- Ten years ago there were a few pioneers, and now there is an established and growing industry.
- More clients are demanding better services, and a larger part of the building community is going green. The building industry is conservative, but the green building movement is having an impact.
- People coming out of school are really interested in green building. Green building doesn't really cost more. It will eventually become a matter of course; contractors are already expecting to recycle materials. They "get it" now.

Drivers of Consumer Demand

Many respondents noted that the industry is dependent upon consumer demand, both from residential and commercial or institutional customers. Increases in consumer demand were described as related to people's increased education and awareness about the benefits of green building:

- Today's clients are much more savvy, experienced.
- There's been a generational change. Green building captures the values of a generation and is the most exciting thing to happen in building in a long, long time. It's "the next big thing."
- Growth has been caused by a population increasingly educated about greenhouse gasses, climate change, and ecological design. Events like 9/11 and WTO riots have had an impact.

- Over the past year, the concept of sustainability has taken off: it's gained traction because it intervenes in the traditional fight between business and the environment, finding common ground in what is good for both.

Public Sector Stimuli

Respondents noted that the public sector has been instrumental in developing Seattle's green building industry.

- The City has already done its part by building buildings that are case studies, and this has stimulated the supply chain.
- Seattle has had invaluable public leadership in growing its green building industry.
- Most public projects have some green building goals.
- Paul Schell appointed Tony Gale as the City's architect in 1999. Design efforts in Europe were leading, starting about 1977. Nothing was happening in Seattle back then! This caused a major sea change in the building industry. Seattle passed the sustainable building policy — the first of its kind in the world — and this is the right place to do it. We now have 17 registered Silver LEED buildings in Seattle, 16 in the works, and 31 municipal LEED buildings.
- Leadership by the City of Seattle has been very important: the City is a national leader in promoting green building through its Silver and Gold LEED projects; its green building team, Seattle Public Utilities and other initiatives.
- The City of Seattle said that its new buildings had to meet Silver LEED. This was gusty, really setting the bar high.

One respondent contrasted the experience in Seattle, Portland, and Vancouver:

- Seattle was the first city to require green building in public buildings. It established itself as a leader by doing so. No other city has had such building per capita – 17 recent City-funded buildings – much less made them green.

  No such public investment was made in Portland, where there just hasn't been this type of public development. The green building industry in Portland has been fuelled by the private sector – a group of people committed to making it happen. Vancouver is a hybrid of public and private stimuli, with the added international influence of a large influx from Hong Kong in 1998/99.

One respondent noted that "colleges are leading, by building green buildings and training green practitioners."

Increasing Demand in the Private Sector

Several respondents noted that demand for green office space from the private sector is growing:

- The public sector in Seattle has led the green building trend, but the private sector is starting to catch up.
- The true revolution that is happening now is that the private sector is adopting green building goals and standards. This is based largely on the firms' values. Practical benefits and costs are considerations as well, such as productivity and particularly health. But primarily it is a firm's value system which drives it to create a green building. I see this trend continuing – we're in a strong transition right now.
- 50% of High Performance Sustainable Building is private or non-profit.

Perceived Health Benefits

In all of these sectors, consumers seem particularly motivated by the *health* benefits of green building:

- Practical benefits and costs are considerations… such as productivity and particularly health.
- Green products are marketed first based on aesthetics, performance, durability, and price competitiveness. Environmental and health benefits are a bonus – "icing on the cake." The health benefits resonate more with most consumers as it's more immediate than impact to the environment.

Increasing Industry Interest

Respondent's also noted that individuals working on the supply side of the equation are increasingly interested in and educated about green building:

- The movement has taken off because it's not jobs versus the environment, but real business-minded people pursuing business fundamentals.
- Interest in architectural community is extremely high — over half of those we surveyed want to design green buildings.

Future Outlook

Respondents were universally enthusiastic about the future of the green building market, with most expressing confidence that the promising trends seen in the past several years will continue:

- I see it growing and becoming more mass market, though I'm not sure what that looks like. I see regular retailers (Home Depot, Lowe's) carrying more of some of the products, but perhaps not jumping on the environmental marketing angle – they'll carry some of the products because they're gorgeous, quality products.
- I'm not sure what the industry will look like in terms of 'structure'. I think (hope) there will be businesses like Environmental Home Center that expand their market share, but I believe that many of these products will end up in more mainstream stores too. Ideally, all building materials sold would be 'green'.... as the idea of this movement is to change the industry.

II. SUSTAINABLE BUILDING IN SEATTLE

An Established Leader in the Field

Several respondents noted that Seattle is already an established center of green building:

- Seattle has established a leadership position in both green building and sustainability more generally.
- Seattle is in the top 10 cities nationwide. We used to be the top: we've slipped, but that's because we're not promoting it as well as we should be. If you look at numbers, we're the innovators. People come here from around the country. The City needs to promote this more.

Explanations for this generally focused on the values of the City's population:

- There are few places in the world like Seattle – the values of the population made it fertile ground for such a movement.
- The beauty of Seattle's natural environment creates a strong environmental value in people and firms.
- We have a lot of smart people.

What brought your business to Seattle? What keeps you here?

Several individuals responded saying that the firm was founded by a local resident or as a family business.

Others spoke of deliberately choosing to practice in Seattle:

- We moved to Seattle because of the quality of the business climate and quality of life. There is a greater ability to recruit and retain the best talent from Seattle.
- Practicing where you live is sustainable. Practicing in Seattle now is like what it must have been like in Florence in 15th century. There's a real renaissance here — we even have our Mediccis in the form of the Gates and Allens.
- Seattleites have an interest in the environment, social justice, good politics, vital downtown. We looked at cities all over the country and chose Seattle.

What factors make it easy to do sustainable building in Seattle?

Strong Demand and Ready Supply of Knowledgeable Experts

The principle response to this question was a reflection of high public and private demand for green building, as well as a ready presence of experts and supply of goods:

- The Seattle public is well-educated, and this helps. Green consumers have to have a good understanding of the world. Similar to the organic foods movement, green building buyers are LOHAS [Lifestyles of Health and Sustainability]. Corporations drive buildings — and Seattle has a high percentage of "LOHAS" corporations.
- Seattle is probably one of the easier places to practice. There is good knowledge among clients and contractors and there is a high level of resources. The population has an inclination to environmental sensitivity.
- In residential development, there are more knowledgeable green contractors in Seattle than anywhere else in the region. The Ecobuilding Guild brings them together.

The City's Role

Several respondents noted that the City continues to support sustainable building (though other comments, below, were more critical of the City):

- It's the City of Seattle that makes it easy!
- People at the Department of Planning and Development are colleagues. The City is helping.
- Permitting is cooperative.

An Active Community

One interviewee noted that Seattle has an active green building community forum:

- The Seattle LEED users group meets once a month to talk about various issues related to LEED. This active community allows people to interact, network, and share ideas, despite being in competition. This has helped foster the industry locally.

What factors make it difficult?

Constrained Supply of Key Inputs

The greatest difficulty noted by respondents was the available supply of green products, though the situation was described as much improved compared to even several years ago.

- Certified sustainable lumber is tough to obtain — it's an emerging market.
- The biggest issue is the supply of sustainable materials and tradespeople meeting demand. One client had trouble finding materials that were affordable. Things are becoming more affordable, but the trend needs to continue.
- Some products are not easily, regularly available: for instance wood flooring is not always available in a particular species – if you see it on the market, grab it because you don't know when it may appear again.
- Many of our suppliers are – almost by definition – small and unable to scale up to Home Depot or Lowe's level of sales.
- We're investing in growing the market – it's too immature for us to be passive.

Seattle-Specific Constraints

- A lot of our work is outside of Seattle: Seattle is the most inflexible jurisdiction in the region. Tacoma is much more flexible. Seattle needs to be more nimble. This is a general frustration; I have to say that the green building people at the City are all amazing.
- Our goal is to do more work in the City, but land is expensive and its way more competitive to develop here. Because of this, we'll likely do more work outside of Seattle.

The "What Worked Last Time" Phenomenon

Another difficulty mentioned was the relatively conservative nature of the building industry:

- General stasis — the 'what worked last time' phenomenon is prevalent. It's risky to do things differently, to innovate.
- Ultimately, there has to be consumer demand. Contractors don't want to change unless there is vocal consumer demand for a product.

What are the top two or three actions the City should take to encourage growth of sustainable building in Seattle?

Incentives and Expedited Permitting

Incentives were the most frequently recommended specific City-led actions to promote the industry:

- Tacoma has incentives to encourage desirable development according to its economic development goals. Why couldn't Seattle define green buildings as desirable development and create incentives to encourage it?
- The use of incentives should be expanded by the City, Bonneville Power Administration, and others. The City has really improved its service orientation and now incentives are needed to walk the talk.
- More incentives similar to the LEED incentives that City Light has are needed, especially for soft costs.
- Upzoning: allow increased FARs, height and density for green building.
- Change zoning and floor-area-ratios (FARs) for green buildings.
- Implement additional incentive strategies to minimize building footprints: zoning, height, etc.

Respondents also gave frequent and strong recommendation to expedite the permitting process for green buildings:

- Accelerate the SEPA and Master Use Permit (MUP) timeline for green buildings: go from 120 to 60 days and guarantee developers expedited permitting.
- Give "green lights to green projects," cutting permitting for green buildings by half.
- Provide fast-track building permits for green buildings.

An Economic Development Lens

The City was advised to approach its fostering of Seattle's green building cluster from an economic development perspective:

- We have a nucleus of important economic activity around green building in Seattle. Professionals from Seattle are seen as national experts, and Seattle is right there with Portland and Vancouver in terms of being national centers of green building. This is terrific for economic development and provides important tax base and jobs.

  I've seen that the environmental ethic is an important factor in creating an attractive city which attracts workers. Also, the cost of resources from an infrastructure strategy perspective is an important element in attracting businesses: the key to the 21st Century will be getting more for less.
- There should be greater collaboration among Portland, Seattle and Vancouver. The City should expand its horizons, recognizing that together these three cities have a chance of becoming the Silicon Valley of the green building world: the center of innovation, financing, etc. This will attract other firms here, just as high-tech firms need to be near Silicon Valley. This center of the green building world has yet to be determined.

  The Pacific Northwest should not compete with itself, but against Pittsburg, Austin, and other cities across the country. We have the buildings, but not the industry: the product manufactures, which is where the real tax base is in terms of economic development. We want them to locate here and so need to make it an attractive environment. To do so requires collaboration and investment by these three cities.

The City as a Market Maker

Some respondents encouraged the City to continue to function as a market maker through direct participation in the marketplace:

- The City should purchase Forest Stewardship Council materials!
- Public utilities can invest in high performance technology, such as the heating and cooling districts already in play in Europe.
- The City should focus on water and waste water.
- Seattle needs to assess and plan for the needs of the 21st Century city, which may be different from the needs of the 20th Century city. High Point and other demonstration projects are examples of this.

Education and Promotion

Some respondents focused on the City's ability to increase demand and encourage supply through education and the promotion of sustainable building benefits directed both at consumers and at the trade:

- Seattle needs to exert continued public leadership.
- Continue to create demand by promoting the benefits of green building.
- The City has already done some great things. The Green Building Program has produced some wonderful green remodeling guides. They are great in that they not only promote the ideas, but they also provide resources that people can use to actually implement the concepts. The City could do more of this consumer education to enhance demand. The City could provide similar education to the trade.
- Educate the finance and real estate community.
- The City should be a resource and make it easier to do sustainable development. Vulcan had to make their own guide; not everyone can do this.
- Emphasize capital vs. operating costs: green buildings do not cost more if you measure them the right way, including long-term operating efficiencies. For costing, be sure you're building comparable quality buildings: high performance buildings are generally higher quality and therefore more expensive anyway.

The Need for Documentation

The City was encouraged to document the results from its investments in green buildings:

- The City has taken the lead, but there is little to no reporting on measurable successes. This is a missed opportunity. Developers will approach sustainable building with some skepticism, so they need to see bottom line impacts: what's the overall outcome?
- Document the City's experience with green building and how these facilities are performing: show them off as case studies.

Just Require It

Some respondents expressed the opinion that the City should simply require the implementation of sustainable building practices:

- The City should make sustainable building principles a percentage requirement for all new buildings.
- The City needs to encourage more of it — maybe require it? They need some teeth!

III. THE MAKEUP OF SEATTLE'S SUSTAINABLE BUILDING CLUSTER

What other businesses do you work with frequently? What related associations do you belong to?

Who are the most important players in Seattle's sustainable building community?

Firms, non-profits, and other institutions are listed below. Individual names are included when they were noted prominently by respondents.

Firms

Architects

Jones & Jones	Paul Olson
Living Shelter Architects	
LMN Architects	
Mahlum	Anne Chopp
Miller/Hull Partnership	David Miller
NBBJ	
Robert Harrison Architects	
Velocipide	George Ostrow

Developers

Community Catapult Developers	Mark Huppert
Gregory Broderick Smith Real Estate	Greg Smith
Mithun	Deb Gunther
Vulcan	Hamilton Hazelhurst

Construction Companies

Paladino & Company	Tom Paladino
Sunshine Construction	John Alexander

Contractors

GLY	
RAFN	Anne Schusler
Sellen	
Skanska	
Turner	Jim Goldman; Craig Veerling

continued

Electrical and Mechanical Engineers

2020 Engineering — Chris Web
Aardvark Engineering
Abacus
CDi Engineers
Flack and Kurtz
KEEN
Sparling

Civil Engineers

Magnusson Klemencic Associates
SVR

Consultants

Ecotope
O'Brien & Company, Inc.
SSA Acoustics

Non-Profit Organizations & Institutions

American Institute of Architects
American Solar Energy Society
American Society of Heating, Refrigerating and Air-Conditioning Engineers
Associated General Contractors of America
Built Green
Lighting Design Lab; Daylighting Lab; Better Bricks
Northwest Ecobuilding Guild
Northwest Intentional Communities
Seattle Pacific University: Peter Dob
Society for Building Science
United States Green Building Council

Who is your competition? Do you compete primarily with local firms or regional or national firms as well?

Responses were specific to each company, with the notably common theme that competitors were uniformly from the Pacific Northwest. No respondent spoke of competitors other than those in Vancouver, Seattle, and Portland.

Competition was noted between some for-profit and non-profit organizations, and some smaller businesses noted increasing competition from larger firms "who are out to make a buck. Bigger firms are doing this, mostly because of City and County contracts. For example, some very large firms are bidding on the small Cascade Community Center job of about 3,000 square feet."

How does your business learn about technology developments in sustainable building? Where do you learn and obtain training for the sustainable building techniques you use in practice?

The most frequently mentioned associations were the following three institutions:

- Master Builders
- The Northwest Ecobuilding Guild
- The US Green Building Council (both nationally and Cascadia chapter)

Other local institutions mentioned included:

- Various seminars and talks by the City of Seattle
- "Better Bricks" and the Northwest Energy Efficiency Alliance

Publications were cited as a frequent source of information:

- *Environmental Building News*
- Journals and national publications
- Catalogs, CDs, and seminars

National organizations were also cited:

- American Council for Energy Efficiency
- Carnegie Melon
- Center for the Built Environment at the University of California at Berkeley
- Lawrence Berkeley labs
- Lighting Research Center in New York
- New Buildings Institute (in White Salmon, Washington)

Respondents stated that personal and professional interactions were vital in keeping current on industry developments:

- Internal brown-bags
- Colleagues in the architecture and education field
- A lot is personal

IV. MEASURING SUSTAINABLE BUILDING-RELATED ECONOMIC ACTIVITY IN SEATTLE

How would you suggest we measure the sum of sustainable building-related economic activity in Seattle?

LEED, Built Green, Energy Star or Lighting Lab Participants

Many respondents suggested tracking LEED, Built Green, and Energy Star figures:

- Count the number of LEED projects awarded, registered, designed.
- You could pick a project, get its LEED documents and extrapolate from there.

Another recommended measure was the number of LEED accredited professionals:

- Seattle has more LEED-accredited professionals than any other city. As of July 2004, there were about 10,000 LEED-accredited professionals globally. Seattle is first, with 383 and then San Francisco with 283. Portland is sixth, with 214.

- LEED membership status is doubling every year. The Master Builder's Built Green is on same growth curve with 50-100% growth annually.

The Lighting Design Lab at the University of Washington was recommended by several respondents as a central point of data collection for many of the area's sustainable building efforts:

- The Lighting Design Lab estimates that they are reaching 15% of new buildings in Oregon and Washington.
- In the Northwest, 65 million square feet of construction has been added in 2004 to date; 15 million square feet of this is warehouse. Five million square feet of buildings went through the UW Daylighting Lab, so nearly 10% of non-warehouse construction could be considered "green."
- Interview Joel Loveland at the Seattle Daylighting Lab. He probably knows a lot about projects in the City, with over 100 projects per year going through the lab.

Key Green Building Supplies

Multiple respondents recommended tracking sales of key supplies that go into sustainable buildings. Of these, Forest Stewardship Council wood was mentioned most frequently.

- Track demand for particular bellwether products such as FSC lumber sales.
- LEED has specific points for local purchasing.
- Contact suppliers of Forest Stewardship Council product: Roseburg & Fritch Mills are supplying FSC plywood. Tacoma is certified. The Environmental Home Center might be a good contact. Try Hampton Lumber.
- Two specific products that you might want to do research on as far as sales/market share in Washington State are Forbo Marmoleum and FSC wood products.
- Look at mills: volume and where it is going are important.

Additional Suggestions

- The USGBC estimates that 3-4% of construction nationally is green building, based on LEED registrations, not certifications. This is a conservative number because many buildings may have green building elements, but don't register for certification.
- Look at national data and compare Washington's overall share.

- Look at national data by the Harvard Joint Center on Housing Study and the National Association of Home Builders.
- Meet with steering committee of the Sustainable Development Center.
- Look at the earlier Northwest Ecosystem Alliance study.

Complexities

Respondents were clear that while it would be very desirable to quantify sustainable building related activity, a number of complexities make it a difficult task:

- This would be a great figure to have, but complex to calculate, as most firms only do a percentage of their work in green building: you'd have to discount their total employment figures.
- The metric for measuring green buildings is too often dollars. Use other metrics such as reduction in CO2, reduction in embodied energy, increase in cycling, decrease in pollutants, etc. Do post-occupancy evaluations: how are the buildings actually working?
- Many buildings don't go through the LEED certification process. I'd estimate that 25% of green buildings are certified while the rest aren't.
- Be careful of people who are greenwashing!

V. BUSINESS PROFILE

Why did your business decide to participate in sustainable building activities?

Most respondents stated that their firm's entry into sustainable business was driven by a set of values, which for some was formalized in the organization's mission.

- It's been the heart of our mission since the beginning. We've always done it this way.
- It's a mission of the firm: we're after the triple bottom line.
- Our founder is personally committed to it; he believes it is the right thing to do. It's a matter of personal passion.
- Because we care about the environment and because there is a demand.

What percentage of building activity does your overall business do now that can be categorized as sustainable building?

Several respondents replied that they didn't know. Other answers included 1%, 20%, 70%, and 100%:

- One hundred percent of our work has some aspect of green building, but not every project is certified. It is part of our core philosophy to re-use existing building stock.
- We attempt to imbue elements of green building in all of the work we do, but our clients are very different and have very different needs. Some are following a checklist certification like Built Green or LEED, others are not. We have a very strong, small R&D group, but generally everyone here is familiar with green building – it's part of our culture, our identity, our brand.
- It varies from month to month. We're shooting for 100% and generally achieve about 75%.

Estimate how much of the total market your company holds in Seattle.

Several respondents replied that they simply didn't know, pointing to a general lack of understanding about the total size of the industry in Seattle.

Several firms estimated their market share to be between 1% and 5%.

How many people does your firm employ?

Two companies have less than ten employees and another has "a direct staff of 6, but contracts out a lot, perhaps the yearly equivalent of 20-25 FTEs."

Four other firms employ between 10 and 30 employees and three others have more than 100 employees.

How has doing sustainable building changed your number of employees, salaries, and requirements in your business?

Most respondents stated that salaries paid by firms involved in sustainable building were no different than the industry norm.

- Our salaries are no different.
- Our salaries are comparable to other firms of similar size.
- We pay better than average, but not top dollar.

In terms of hiring, most respondents stated that expertise in green building was not an absolute requirement, though interest and experience was described as an asset:

- I was the only one hired for my green building expertise.
- Our work is pretty cross-disciplinary. We don't necessarily seek out green building people specifically.
- We require an interest or passion in it
- We're not doing sustainable design directly, as we depend on consultants for this. We look for people with an interest in this, though not necessarily LEED accredited professionals.

Two respondents noted that by positioning their firms as focused on green building, they were able to market more effectively to customers and to attract staff:

- It's helped in recruiting, because people are drawn to our values.
- People seek us out because of our reputation for focusing on sustainability.

How much of your business is done here in Seattle and how much outside of the area?

Two firms stated they did all of their work in Seattle. Others estimated that 5%, 25%, 40%, or 50% of their work is outside the City.

Are you planning additional business investment or expansion in Seattle? Are you planning to expand your sustainable building investments or services offered in Seattle?

Several respondents said they planned both to expand their overall operations and to offer more sustainable building services in particular. Others said they would likely not expand the size of their staff, but hoped to do more green building work.

Others said they would likely not expand in the near future.

STAKEHOLDERS INTERVIEWED

Contractors/Consultants

1. Jim Goldman — Turner Construction

Architects/Designers/Engineers

2. Paul Anseeuw — KEEN
3. Tony Gale — FultonGale
4. Bert Gregory — Mithun
5. George Ostrow — Velocipede

Developers

6. Hamilton Hazlehurst — Vulcan
7. Douglas Howe — Touchstone
8. Mark Huppert — Catapult
9. Sandra Mallory — Environmental Works
10. Tom Paladino — Paladino & Company

Suppliers

11. Lisa DiMartino — Environmental home Center
12. Racine Snyder — Dunn Lumber

Institutions

13. Glen Gilbert — Cascadia Chapter Green Building Council
14. Dave Hewitt — NW Energy Efficiency Alliance
15. Sage Saskill — NW Ecobuilding Guild

STAKEHOLDER INTERVIEW PROTOCOL

Objectives

1. Determine cluster definition
2. Estimate cluster activity and trends through number of firms, revenue, jobs and average wages and Seattle Specific Indicators
3. Create a list of recommendations for the city to consider

I. Begin with a discussion of the purpose of the study

II. Define High-Performance Sustainable buildings

Sustainable buildings are water and energy efficient, minimize waste, maximize use of recycled content materials, create healthy indoor environments for workers, employ resource efficient materials and incorporate environmentally sensitive site planning. This term is often used interchangeably with "Green Building."

III. Interview

Seattle's Sustainable building Cluster

9. What other businesses do you work with frequently? What related associations do you belong to?

10. Who is your competition? Do you compete primarily with local firms or regional or national firms as well?

Industry Outlook and Trends

4. Have you seen growth in demand for sustainable building in the last 5 years? To what degree? How do you measure this?

5. What are the key issues affecting the growth or decline of the sustainable building industry in general? In Seattle? How do you see the industry changing over the next five years?

Seattle-Specific Factors

6. What brought your business to Seattle? What keeps you here?

7. What factors make it easy to do sustainable building in Seattle? What makes it difficult?

8. What are the top two or three actions the City should take to encourage growth of sustainable building in Seattle?

11. How does your business learn about technology developments in sustainable building? Where do you learn and obtain training for the sustainable building techniques you use in practice?

12. How would you suggest we measure the sum of sustainable building-related economic activity in Seattle?

Quick Business Profile

13. Why did your business decide to participate in sustainable building activities? What percentage of building activity does your overall business do now that can be categorized as sustainable building, and who is your main client base (residential, commercial, government, etc.)?

14. a) Estimate how much of the total market your company holds in Seattle.
    b) How many employees does your firm employ?

15. How has doing sustainable building changed your number of employees, salaries, and requirements in your business?

16. How much of your business is done here in Seattle and how much outside of the area?

17. Are you planning additional business investment or expansion in Seattle? Are you planning to expand the sustainable building investments or services offered in Seattle?

In Closing

18. Who else should we be talking to?

19. Would you be willing to comment on two additional pieces – a cluster map and a list of local firms involved in sustainable building – that we would email you later?

ATTACHMENT B:
SEATTLE'S SUSTAINABLE BUILDING CLUSTER BUSINESS AND ORGANIZATION INDEX

Company Name	Business Type	Cluster Map Category	Source
8484 Architecture	Architect	Architects/Designers/Engineers	Green Pages
AKS Architecture	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Arai Jackson Ellison Murakami	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Arc Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Atelierjones	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Bassetti Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
BJSS Duarte Bryant	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
BLIP design	Architect	Architects/Designers/Engineers	Green Pages
Boxwood Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Brian Johnson Architect	Architect	Architects/Designers/Engineers	Green Pages
Brumbaugh & Associates	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Callison Architecture	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Carlson Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
CASE Design & Project Management	Architect	Architects/Designers/Engineers	Green Pages
Charter Construction	Architect	Architects/Designers/Engineers	Green Pages
Clinkston Brunner Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Curtis & Emmons, Architects	Architect	Architects/Designers/Engineers	Green Pages
David Vandervort Architects, AIA	Architect	Architects/Designers/Engineers	Green Pages
Dimarco Architecture	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
DKA	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional

Company Name	Business Type	Cluster Map Category	Source
DLR Group	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Don Argus, AIA	Architect	Architects/Designers/Engineers	Green Pages
ECH Architecture	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Environmental Works	Architect	Architects/Designers/Engineers	Green Pages
Fulton Gale Architects	Architect	Architects/Designers/Engineers	Berk Research
Gensler	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
GGLO Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Heliotrope Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Hewitt Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Integrus Architecture	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Janice Nyman Architects	Architect	Architects/Designers/Engineers	Green Pages
Jensen/Fey Architecture & Planning	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Jones & Jones Architects And Landscape Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
KPG Inc.	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Krei Architecture	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
LMN Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Mahlum Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Mazurek Architecture	Architect	Architects/Designers/Engineers	Green Pages
MBT Architecture	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Michelle Quesada, Architect	Architect	Architects/Designers/Engineers	Green Pages
Miller Hayashi Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Miller/Hull Partnership, LLP	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
ming | architecture & design	Architect	Architects/Designers/Engineers	Green Pages
Mithun	Architect	Architects/Designers/Engineers	Green Pages

Company Name	Business Type	Cluster Map Category	Source
MTH Architects	Architect	Architects/Designers/Engineers	Green Pages
NBBJ Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Northwest Architectural Company	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Olson Sundberg Kundig Allen Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Perkins & Will	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
PLACE architects	Architect	Architects/Designers/Engineers	Green Pages
Robert Harrison Architects	Architect	Architects/Designers/Engineers	Green Pages
ROGER WILLIAMS FAIA JIA	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Schreiber & Lane Architets PS	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Sclater Partners Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Shks Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Sparling	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Srg Partnership	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Stickney Murphy Romine Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Studio Meng Strazzara	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Sullivan Conard Architects	Architect	Architects/Designers/Engineers	Green Pages
Swenson Say Faget	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
TCA Architecture - Planning Inc.	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Ted Granger, Architect	Architect	Architects/Designers/Engineers	Green Pages
The Austin Company	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
The Berger Partnership, P.S.	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
The Miller Hull Partnership LLP	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
The Portico Group	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Thomas Roth & Associates Inc. P.S.	Architect	Architects/Designers/Engineers	Green Pages

Company Name	Business Type	Cluster Map Category	Source
Van Horne & Van Horne Architects	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Van Horne and Van Horne Architects, PLLC	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
VELOCIPEDE architects	Architect	Architects/Designers/Engineers	Green Pages
Verge Architecture, Inc.	Architect	Architects/Designers/Engineers	Green Pages
VIA Architecture	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Via Suzuki Architecture	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Viridian Architecture and Design	Architect	Architects/Designers/Engineers	Green Pages
Weber + Thompson	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Weinstein A U	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Whitney Architecture	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Zimmer Gunsul Frasca Partnership	Architect	Architects/Designers/Engineers	LEED™ Accredited Professional
Opperman Design	Designer	Architects/Designers/Engineers	Green Pages
Ten Directions Design	Designer	Architects/Designers/Engineers	Green Pages
WE-Design	Designer	Architects/Designers/Engineers	Green Pages
Winter Sun Design	Designer	Architects/Designers/Engineers	Green Pages
Abacus Engineered Systems	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Abkj Engineers	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Affiliated Engineers, Inc.	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Coffman Engineers	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Coughlin Porter Lundeen	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Degenkolb Engineers	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Earhart Engineering Inc.	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Ecotope	Engineer	Architects/Designers/Engineers	Green Pages
EEI	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Elcon Associates, Inc.	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Encompass Mechanical Services	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Engineering Economics Inc	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional

Company Name	Business Type	Cluster Map Category	Source
Flack + Kurtz Inc.	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
FSi consulting engineers	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Glumac International	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Gray & Osborne	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Hargis Engineers Inc.	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Heery International Inc.	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Holaday-Parks, Inc.	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
KDD & Associates	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Keen Engineering	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Kent Barber P.E.	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
KPFF Consulting Engineers	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Magnusson Klemencic Associates	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
MW Consulting Engineers	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Notkin Engineering	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Olympic Associates Company	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Parsons Brinckerhoff	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Penhallegon Engineers, Inc.	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
PSF Mechanical Inc.	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Quantum Consulting Engineers	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Robert Foley & Associates, Inc.	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Rosewater Engineering	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Sider and Byers	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
SvR Design Company	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Tetra Tech/Kcm	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
The Greenbusch Group Inc.	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional

Company Name	Business Type	Cluster Map Category	Source
TKG Consulting Engineers, Inc.	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
URS Corporation	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
Us Army Corps Of Engineers	Engineer	Architects/Designers/Engineers	LEED™ Accredited Professional
1Earth 1Design™	Interior Design	Architects/Designers/Engineers	Green Pages
Greener Lifestyles	Interior Design	Architects/Designers/Engineers	Green Pages
Penates Interior Design	Interior Design	Architects/Designers/Engineers	Green Pages
Robert Harrison Architects	Interior Design	Architects/Designers/Engineers	Green Pages
Barker Landscape Architects	Landscaping	Architects/Designers/Engineers	Berk Research
Susan Black and Associates	Landscaping	Architects/Designers/Engineers	Berk Research
A.D. Green Construction	Builder	Builders	Green Pages
Aboveboard Fine Carpentry	Builder	Builders	Green Pages
Baron Building and Design	Builder	Builders	Green Pages
Bright Street Construction, Inc.	Builder	Builders	Green Pages
Brooks Painting and Home Repair	Builder	Builders	Green Pages
Charter Construction	Builder	Builders	Green Pages
CJR Associates, Inc.	Builder	Builders	Green Pages
Envision Homes, Residential Remodel & Design	Builder	Builders	Green Pages
Exteriorscapes llc	Builder	Builders	Green Pages
Ferguson Construction Inc.	Builder	Builders	LEED™ Accredited Professional
Harmatta Construction, Inc.	Builder	Builders	LEED™ Accredited Professional
HHB Inc.	Builder	Builders	LEED™ Accredited Professional
Hoffman Construction Company	Builder	Builders	LEED™ Accredited Professional
J.A.S. Design-Build, Inc.	Builder	Builders	Green Pages
Kiewit Construction	Builder	Builders	LEED™ Accredited Professional

Company Name	Business Type	Cluster Map Category	Source
Kinesis Construction, Inc.	Builder	Builders	Green Pages
Living Lightly	Builder	Builders	Green Pages
Logan Services	Builder	Builders	Green Pages
Martha Rose Construction	Builder	Builders	Green Pages
McKinstry Construction	Builder	Builders	LEED™ Accredited Professional
Rockwood-Greene Co.	Builder	Builders	Green Pages
Sunshine Construction	Builder	Builders	Green Pages
Thomas Jacobson Construction	Builder	Builders	Green Pages
Tom Balderston Design & Construction	Builder	Builders	Green Pages
Cochran Inc.	Contractor	Builders	LEED™ Accredited Professional
Home Improvement Services - Seismic Retrofit	Contractor	Builders	Green Pages
Home Improvement Services/Seizmic Retrofit	Contractor	Builders	Green Pages
J.R, Swartz Cedar Fence Specialties	Contractor	Builders	Green Pages
Lease Crutcher Lewis	Contractor	Builders	LEED™ Accredited Professional
Prime Plumbing	Contractor	Builders	Green Pages
Retro-Sketch Ink - Permitting Services	Contractor	Builders	Green Pages
Sellen Construction Co. Inc.	Contractor	Builders	LEED™ Accredited Professional
Skanska Building Inc. Usa	Contractor	Builders	LEED™ Accredited Professional
Turner Construction	Contractor	Builders	LEED™ Accredited Professional
W.G. Clark Construction	Contractor	Builders	LEED™ Accredited Professional
Buck and Gordon	Developer	Builders	LEED™ Accredited Professional
Built-e, Inc.	Developer	Builders	LEED™ Accredited Professional
Bumgardner	Developer	Builders	LEED™ Accredited Professional
Gregory Broderick Smith Real Estate	Developer	Builders	Berk Research

Company Name	Business Type	Cluster Map Category	Source
Paladino and Company	Developer	Builders	LEED™ Accredited Professional
Pine Street Group LLC	Developer	Builders	LEED™ Accredited Professional
Vulcan	Developer	Builders	Berk Research
hadj design	Landscaping	Builders	Green Pages
Tree Solutions Inc.	Landscaping	Builders	Green Pages
WE-Design	Landscaping	Builders	Green Pages
Jackson Remodeling LLC	Remodeling	Builders	Green Pages
Northwest Homecrafters, Inc	Remodeling	Builders	Green Pages
Phinney Nbhd Assoc Well Home Program	Remodeling	Builders	Green Pages
Thomas Jacobson Construction	Remodeling	Builders	Green Pages
Tom Balderston Design & Construction	Remodeling	Builders	Green Pages
Benjamin Moore Paint	Supplier	Distributors/Suppliers	Berk Research
Candela Lighting Design Sparling Inc.	Supplier	Distributors/Suppliers	LEED™ Accredited Professional
Dunn Lumber	Supplier	Distributors/Suppliers	Berk Research
Dupont Antron Carpet Fiber	Supplier	Distributors/Suppliers	LEED™ Accredited Professional
Environmental Home Center	Supplier	Distributors/Suppliers	Green Pages
Environmental Interiors	Supplier	Distributors/Suppliers	LEED™ Accredited Professional
Home Depot	Supplier	Distributors/Suppliers	Berk Research
Northwestern Industries	Supplier	Distributors/Suppliers	Berk Research
Puget Sound Solar	Supplier	Distributors/Suppliers	Green Pages
Rodda Paint	Supplier	Distributors/Suppliers	Berk Research
Sherwin Williams Paint	Supplier	Distributors/Suppliers	Berk Research
Allbee Romein	Consultant	Facilitation	LEED™ Accredited Professional
Atmosphere, Inc.	Consultant	Facilitation	Green Pages

Company Name	Business Type	Cluster Map Category	Source
Catapult Community Developers	Consultant	Facilitation	Green Pages
Eco-Logic	Consultant	Facilitation	LEED™ Accredited Professional
Ecology of the Heart	Consultant	Facilitation	Green Pages
EDAW, Inc.	Consultant	Facilitation	LEED™ Accredited Professional
Exeltech Consulting Inc.	Consultant	Facilitation	LEED™ Accredited Professional
Healthy Buildings, Inc.	Consultant	Facilitation	Green Pages
Kathryn Gardow & Assoc., Inc.	Consultant	Facilitation	Green Pages
Maharam	Consultant	Facilitation	LEED™ Accredited Professional
Murase Associates	Consultant	Facilitation	LEED™ Accredited Professional
Natural Logic, Inc.	Consultant	Facilitation	LEED™ Accredited Professional
Otak	Consultant	Facilitation	LEED™ Accredited Professional
Pacific Lighting Systems	Consultant	Facilitation	LEED™ Accredited Professional
Personal and Business Coaching and Consulting	Consultant	Facilitation	Green Pages
Resource Rescue	Consultant	Facilitation	LEED™ Accredited Professional
Resource Venture	Consultant	Facilitation	Green Pages
Seneca Real Estate Group	Consultant	Facilitation	LEED™ Accredited Professional
Studio Celadon	Consultant	Facilitation	LEED™ Accredited Professional
Tree Solutions Inc.	Consultant	Facilitation	Green Pages
Wilson Jones Consulting	Consultant	Facilitation	LEED™ Accredited Professional
WJA Design Collaborative PLLC	Consultant	Facilitation	LEED™ Accredited Professional
Army Corps of Engineers	Government	Facilitation	LEED™ Accredited Professional
Seattle City Light	Government	Facilitation	Berk Research
Seattle Department of Planning and Development	Government	Facilitation	Berk Research
Seattle Office of Sustainability and	Government	Facilitation	Berk Research

Company Name	Business Type	Cluster Map Category	Source
Environment			
Seattle Public Utilities	Government	Facilitation	Berk Research
Lighting Design Lab	Institution	Facilitation	Berk Research
Master Builders Association	Institution	Facilitation	Berk Research
Northwest Eco-Building Guild	Institution	Facilitation	Berk Research
Northwest Energy Efficiency Council	Institution	Facilitation	Berk Research
University Of Washington Cap. Projects	Institution	Facilitation	LEED™ Accredited Professional
University Of Washington Daylighting Lab	Institution	Facilitation	Berk Research
Bedrock Industries	Manufacturer	Manufacturers	Berk Research
Best Paint	Manufacturer	Manufacturers	Berk Research
Eco Coatings	Manufacturer	Manufacturers	Berk Research
TriVitro	Manufacturer	Manufacturers	Berk Research
Urban Hardwoods	Manufacturer	Manufacturers	Berk Research
Earthwise	Reclamation	Reclamation	Berk Research
Seattle Building Salvage	Reclamation	Reclamation	Berk Research
The RE Store	Reclamation	Reclamation	Green Pages
GreenWorks Realty	Realtor	Seller	Green Pages
Kaufman Realty	Realtor	Seller	Green Pages
Madrona Nursery	Seller	Seller	Berk Research
Metaspiral Business Strategies	Seller	Seller	Green Pages
Northwest Native Seed	Seller	Seller	Berk Research
Parsons Public Relations	Seller	Seller	Green Pages
Rosso Wholesale Nursery	Seller	Seller	Berk Research
James Shanahan	Unknown	Unknown	LEED™ Accredited Professional

Attachment C: Detailed Assumptions of Industry Shares and Revenues

DESCRIPTION	SIC	Percent Sustainable Low	Percent Sustainable High	Statewide Gross Revenues, All Revenues	Statewide Wages Paid, All Activity	Seattle Wages Paid, All Activity
AGRICULTURAL SERVICES	**07**	**6%**	**10%**	**$922,136,413**	**$46,577,795**	**$6,755,918**
Landscape Counseling and Planning	0781	8%	12%	$88,168,101	$3,646,765	$2,409,334
Lawn and Garden Services	0782	5%	10%	$748,726,439	$36,836,635	$3,996,353
Ornamental Shrub and Tree Services	0783	1%	3%	$85,241,873	$6,094,395	$350,231
GENERAL BUILDING CONTRACTORS	**15**	**3%**	**13%**	**$10,557,837,231**	**$348,910,860**	**$86,041,661**
General Contractors-Single-Family Houses	1521	3%	10%	$4,758,980,688	$117,099,345	$19,559,568
General Contractors-Residential Buildings, Other Than Single-Family	1522	3%	10%	$421,083,185	$8,664,478	$2,380,178
Operative Builders	1531	3%	10%	$267,798,068	$8,622,134	$289,663
General Contractors-Industrial Buildings and Warehouses	1541	3%	10%	$1,139,421,099	$37,519,915	$9,533,246
Nonresidential Buildings, excl. Ind. Bldgs and Warehouses	1542	3%	15%	$3,970,554,191	$177,004,988	$54,279,006
SPECIAL TRADE CONTRACTORS	**17**	**3%**	**10%**	$12,403,910,693	$718,430,599	$110,850,945
Plumbing, Heating, and Air-Conditioning	1711	3%	10%	$2,638,235,108	$159,377,067	$31,660,938
Painting and Paper Hanging	1721	3%	10%	$584,235,209	$34,241,999	$5,147,525
Electrical Work	1731	3%	10%	$2,163,093,334	$187,874,425	$32,725,576
Masonry, Stone Setting and Other Stone Work	1741	3%	10%	$288,516,340	$18,755,812	$3,155,940
Plastering, Drywall, Acoustical and Insulation Work	1742	3%	10%	$868,671,640	$67,790,494	$6,637,544
Terrazzo, Tile, Marble, and Mosaic Work	1743	3%	10%	$127,572,981	$6,119,824	$1,054,223
Carpentry Work	1751	3%	10%	$769,213,084	$36,894,474	$2,778,115
Floor Laying and Other Floor Work, NEC	1752	3%	10%	$628,675,352	$15,199,792	$2,736,597
Roofing, Siding, and Sheet Metal Work	1761	3%	10%	$1,075,607,837	$37,902,540	$6,170,715
Concrete Work	1771	3%	10%	$778,632,631	$32,060,802	$2,359,535
Water Well Drilling	1781	0%	1%	$90,439,778	$3,076,599	
Structural Steel Erection	1791	3%	10%	$354,655,950	$13,384,825	$1,260,872
Glass and Glazing Work	1793	3%	12%	$167,484,429	$13,033,005	$1,405,019
Excavation Work	1794	3%	10%	$689,238,425	$18,747,920	$66,498
Wrecking and Demolition Work	1795	3%	15%	$135,332,256	$6,128,569	$1,110,537
Installation or Erection of Building Equipment, NEC	1796	3%	10%	$146,762,236	$31,505,476	$7,343,095
Special Trade Contractors, NEC	1799	3%	10%	$897,544,103	$36,336,976	$5,238,216

DESCRIPTION	SIC	Percent Sustainable Low	Percent Sustainable High	Statewide Gross Revenues, All Revenues	Statewide Wages Paid, All Activity	Seattle Wages Paid, All Activity
STONE, CLAY, AND GLASS PRODUCTS	**32**	**3%**	**10%**	$1,092,754,513	$53,803,237	$7,252,615
Flat Glass	3211	3%	12%	$102,738,479	$2,561,298	$187,978
Cement, Hydraulic	3241	3%	10%	$158,216,548	$3,697,330	$1,710,167
Brick and Structural Clay Tile	3251	-	-	*	$953,713	
Ceramic Wall and Floor Tile	3253	3%	12%	$11,212,579	$754,551	$72,226
Clay Refractories	3255	3%	10%	$30,180,388		
Structural Clay Products, NEC	3259	-	-	*		
Concrete Block and Brick	3271	3%	10%	$20,267,213	$1,561,511	$0
Concrete Products, Except Block and Brick	3272	3%	10%	$268,351,738	$13,182,383	$180,292
Ready-Mixed Concrete	3273	3%	10%	$311,549,310	$26,370,636	$3,580,489
Lime	3274	-	-	*	$0	$0
Gypsum Products	3275	3%	10%	$190,238,258	$4,721,815	$1,521,463
PRIMARY METAL INDUSTRIES	**33**	**3%**	**10%**	$628,110,875	$16,544,449	$7,061,509
Steel Works, Blast Furnaces (Including Coke Ovens), and Rolling Mill	3312	3%	10%	$395,372,748	$6,021,424	$4,799,980
Electrometallurgical Products, Except Steel	3313	3%	10%	$0	$0	$0
Steel Wiredrawing and Steel Nails and Spikes	3315	3%	10%	$9,345,348	$447,172	$341,599
Cold-Rolled Steel Sheet, Strip, and Bars	3316	3%	10%	$0	$0	$0
Steel Pipe and Tubes	3317	3%	10%	$5,791,240	$1,110,374	$44,414
Gray and Ductile Iron Foundries	3321	3%	10%	$60,767,998	$2,281,925	
Malleable Iron Foundries	3322	-	-	*		
Steel Investment Foundries	3324	-	-	*		$670,259
Steel Foundries, NEC	3325	3%	10%	$156,833,541	$6,683,554	$1,205,257

DESCRIPTION	SIC	Percent Sustainable Low	Percent Sustainable High	Statewide Gross Revenues, All Revenues	Statewide Wages Paid, All Activity	Seattle Wages Paid, All Activity
WHOLESALE TRADE DURABLE GOODS	**50**	**3%**	**10%**	$6,434,253,507	$205,464,273	$41,433,907
Furniture	5021	3%	10%	$519,665,902	$18,731,438	$7,306,687
Home Furnishings	5023	3%	10%	$451,291,151	$16,699,278	$3,378,859
Lumber, Plywood, Millwork, and Wood Panels	5031	3%	10%	$1,185,802,583	$39,646,070	$1,981,783
Brick, Stone and Related Construction Materials	5032	3%	10%	$235,061,627	$7,572,059	$2,587,893
Roofing, Siding, and Insulation Materials	5033	3%	10%	$274,140,995	$8,649,380	$870,111
Construction Materials, NEC	5039	3%	10%	$826,936,982	$11,849,082	$840,454
Hardware	5072	3%	10%	$781,647,078	$24,944,231	$4,998,244
Plumbing and Heating Equipment and Supplies (Hydronics)	5074	3%	10%	$800,790,348	$28,238,816	$11,297,329
Warm Air Heating and Air-Conditioning Equipment and Supplies	5075	3%	10%	$492,297,099	$21,439,043	$5,176,467
Refrigeration Equipment and Supplies	5078	3%	10%	$66,692,386	$4,547,475	$1,920,852
Construction and Mining (Except Petroleum) Machinery and Equipm	5082	3%	10%	$799,927,356	$23,147,401	$1,075,228
BUILDING MATERIALS & GARDEN SUPPLIES	**52**	**3%**	**10%**	$7,279,704,986	$123,744,442	$11,178,930
Lumber and Other Building Materials Dealers	5211	3%	10%	$5,198,926,529	$89,558,673	$7,867,674
Paint, Glass, and Wallpaper Stores	5231	3%	10%	$305,939,720	$9,855,114	$1,622,656
Hardware Stores	5251	3%	10%	$1,376,684,475	$13,298,747	$772,636
Retail Nurseries, Lawn and Garden Supply Stores	5261	3%	12%	$398,154,262	$11,031,908	$915,964
REAL ESTATE	**65**	**3%**	**10%**	$2,956,120,023	$167,411,769	$58,481,644
Real Estate Agents and Managers	6531	3%	10%	$2,785,521,491	$143,533,538	$51,953,030
Land Subdividers and Developers, Except Cemeteries	6552	3%	10%	$170,598,532	$23,878,231	$6,528,614
ENGINEERING & MANAGEMENT SERVICES	**87**	**7%**	**17%**	$4,194,734,818	$386,222,982	$91,025,620
Engineering Services	8711	5%	15%	$3,161,570,554	$313,417,195	$52,967,745
Architectural Services	8712	10%	20%	$909,785,340	$61,938,030	$35,411,884
Surveying Services	8713	3%	10%	$123,378,924	$10,867,757	$2,645,991