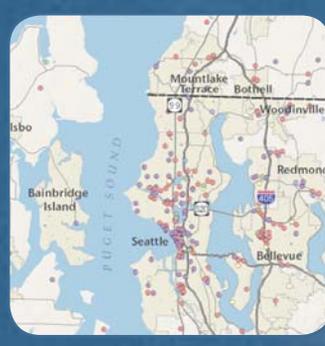




City of MOUNTLAKE TERRACE

CLEAN TECHNOLOGY OPPORTUNITY ASSESSMENT

August 4, 2008



Acknowledgments

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EXECUTIVE SUMMARY

The clean technology industry is a rapidly growing economic force nationally and in the Puget Sound Region. The purpose of this analysis is to define and describe the different sectors that comprise the industry, identify clean technology trends in the Puget Sound Region, and assess Mountlake Terrace's competitive position to benefit from this economic activity given the City's strengths and the needs of clean technology firms.

This document, together with analysis of the City's market potential in other industries, will inform the development of *Mountlake Terrace's Economic Vitality Strategy*.

This report's four sections include the following:

- I. **Clean Technology Industry Description and Assessment.** The clean technology industry is very difficult to define given its emerging and cross-disciplinary nature. This document uses the definition of clean technology coined by Clean Edge, a leading clean tech research firm: "the diverse range of products, services, and processes that harness renewable materials and energy sources, dramatically reduce the use of natural resources, and cut or eliminate emissions and waste."^A Building on this definition, three principle sectors are identified: Energy, Transportation, and Research Efficiency.
- II. **Description and Analysis of Clean Technology Industry Sectors.** Using data from a variety of public and private sources, key indicators for each sector are identified to show national, state, and regional trends in the industry. In addition, the Green Building and Sustainable Design sub-sector of Research Efficiency sector is also examined given its strength in the region. These indicators, along with regional and state employment data, show that clean technology is a small, but growing industry nationally and in the Puget Sound region.
- III. **Industry Level Challenges and Needs.** Interviews with regional clean technology stakeholders—including business owners, investors, and trade group officials—supplement the current trends and data analysis and identify three main categories of challenges faced by clean tech firms:
 - **Firm capacity building challenges**, which include access to a qualified work force and capital and, for the Energy sector in particular, energy volatility and pricing
 - **Market challenges**, including a lack of consistent, well-defined standards; uncertain demand; challenges in distribution; and increasing competition and market maturation
 - **Government and public policy challenges**, which include a lack of familiarity with clean technology and a lack of awareness of and access to existing clean technology incentive programs

^A Clean Edge www.cleantech.com, 2008

IV. Opportunity Assessment. Given its proximity and easy access to Seattle, its nature as a suburban city with a high quality of life, and its affordable but limited land supply, Mountlake Terrace is best positioned to take advantage of growth in the clean technology industry through attracting smaller-scale office and service-oriented businesses in the three clean technology sectors.

In order to differentiate itself from comparable communities in attempting to attract clean technology firms, Mountlake Terrace should consider actions in the following categories:

- **Supportive public policies** often occur at the national and state level, but Mountlake Terrace can employ economic development strategies, such as financial incentives or streamlined permitting and business processes, to target clean technology firms. It is important to note that the implementation of such strategies may be limited by the City's available resources.
- **Business support services** are most effective when they are done in ways that mitigate the identified challenges that most often hamper the development and commercialization of clean technology. Components of support services include having City staff with knowledge and understanding of the clean technology industry; providing customized, hands-on support; facilitating connections between clean tech business and other resources and partners; and promoting the City's services and regional assets.
- **Green image and values** can be cultivated by a city to help attract clean technology businesses and employees that often share those values. To this end, Mountlake Terrace can facilitate demonstration projects showcasing green building and smart growth techniques, adopt clean technology products, and employ other strategies to conserve resources, preserve environmental health, and foster an image as a "green" community. The City's **Sustainability Strategy** identifies and prioritizes actions the City and community can take in this area and provides measures to track and demonstrate the City's progress.

These recommendations will be further evaluated and incorporated as appropriate in the City's **Economic Vitality Strategy** and **Sustainability Strategy**, establishing specific, actionable strategies for enhancing the City's environmental sustainability, community livability, and economic health.

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I. INTRODUCTION

The clean technology industry is a rapidly growing economic force nationally and in the Puget Sound Region. The growth of clean tech businesses, operating in energy, transportation, and resource efficiency sectors, has accelerated over the last ten years due to rising energy prices, resource constraints, and increasing unease with global climate issues.

The purpose of this analysis is to define and describe the different sectors that comprise the industry, identify clean technology trends in the Puget Sound Region, and assess Mountlake Terrace's competitive position to benefit from this economic activity given the City's strengths and the needs of clean technology firms.

Why Focus on Clean Technology?

In addition to the environmental benefits provided by the clean technology economy, firms in this industry are an attractive component of an economic vitality strategy from a purely economic standpoint considering the industry's potential for economic growth and job creation. Clean technology is growing in terms of dollars invested, number of firms, and the number of jobs created.

Analysis conducted in support of the Prosperity Partnership Regional Economic Strategy for the Central Puget Sound Region in 2005 identified clean technology as one of five pilot clusters deserving of regional focus given their "ability to sustain and grow jobs."¹

Clean Technology in Washington State

- There are an estimated 8,095 employees working in clean technology (excluding small-scale hydro).
- From 1994 to 2004, clean tech firms added 2,746 employees, a growth of 72%.
- In terms of total revenue, clean technology is slightly larger than logging and slightly smaller than saw and lumber mills.
- Clean technology jobs are well paying with an average salary of \$60,000.

(Source: Washington State Department of Community, Trade, and Economic Development, *Renewable Energy and Efficiency and Smart Industries in Washington*, 2005)

It is important to note that the number of jobs associated with the clean technology industry is still relatively small. In 2001, the Prosperity Partnership Regional Economic Strategy measured 2,845 jobs in the "environment and alternative energy field"—now renamed "clean technology field"—in the Central Puget Sound Region. The industry definition² used to measure the number

¹ Prosperity Partnership Regional Economic Strategy Summary document, 2005.

² Industries included in the Prosperity Partnership job count are: environmental consulting services, solid waste combustors and incinerators, air purification equipment manufacturing, materials recovery facilities, hazardous waste treatment and disposal, and environment, conservation and wildlife organizations.

of jobs differs significantly from the definition used in this document, most notably by including environment, conservation, and wildlife organizations. However this number provides a sense of the order of magnitude for this emerging industry. In comparison, the Life Sciences field—also identified as a “star cluster” by the Prosperity Partnership—employed 18,804 individuals in the four-county region in 2001.³

Understanding Mountlake Terrace’s Clean Technology Opportunity

The City of Mountlake Terrace is currently developing an ***Economic Vitality Strategy*** that will guide the City’s efforts to strengthen its economy. This ***Clean Technology Opportunity Assessment Report***, together with analysis of business potential in other industries, will inform the development of the ***Economic Vitality Strategy***.

Our process for assessing the City’s competitive position in attracting a share of the emerging regional clean technology industry was composed of the following steps, which correspond to the subjects of the four sections of this report:

- I. Clean Technology Industry Description and Assessment.** The clean technology industry is very difficult to define given its emerging and cross-disciplinary nature. A number of varying definitions are in use regionally and nationally. This section defines the clean technology industry for the purposes of this analysis, which includes the identification of three major industry sectors.
- II. Description and Analysis of Clean Technology Industry Sectors.** Using data from a variety of public and private sources, key indicators for each subsector are identified to show national, state, and regional trends in the industry.
- III. Industry Level Challenges and Needs.** Interviews with regional clean technology stakeholders—including business owners, investors, and trade group officials—supplement the current trends and data analysis to provide unique insights into the needs of clean technology firms in the Puget Sound Region today.
- IV. Opportunity Assessment.** A set of recommendations take into account Mountlake Terrace’s unique characteristics and the needs of clean technology firms identified above to inform the development of the City’s ***Economic Vitality Strategy*** and ***Sustainability Strategy***, which will contain specific strategies to grow the City’s clean tech business sector. Needs and challenges of clean technology firms are used to identify potential opportunities the City may consider as it plans for an economically sustainable future.

³ Prosperity Partnership Regional Economic Strategy Volume II, 2005.

Reaching a Working Definition of “Clean Tech”

Defining clean technology can be challenging because it is still an emerging field embedded in other industries. It affects everything from the cars we drive to the way we build our homes. Thus, it has yet to be formally and consistently defined.

For the purpose of this analysis the definition of clean technology coined by Clean Edge, a leading clean tech research firm, provides a helpful framework for identifying what clean technology is.

Clean Technology is the diverse range of products, services, and processes that harness renewable materials and energy sources, dramatically reduce the use of natural resources, and cut or eliminate emissions and wastes.⁴

The United Nations (UN) definition of clean technology was also referenced to inform this analysis:

“Clean Technologies are new industrial processes or modifications in existing processes or products aimed at reducing the impact on the environment and reducing consumption of energy or raw material, while improving the competitive advantage.”⁵

Drawing on these definitions of clean technology, we describe the industry as composed of three principal sectors: Energy, Transportation, and Resource Efficiency. **Exhibit 1** illustrates this definition, with three overlapping circles representing the three principle sectors of the clean technology industry.

A sampling of specific business areas and products are included for each sector. It is important to note that all three sectors are composed of firms that operate at different points along the value chain, including research and development, manufacturing, distribution, and services. For example, clean technology firms within the Transportation sector include firms active in the development of new hybrid technology, manufacturing of cars, sales, or maintenance of existing vehicles.

Cross-Over Sectors. A unique element of the emerging clean technology industry is the high level of integration and cross-over between sectors, as highlighted by the overlap between the three principal sectors shown in **Exhibit 1**.

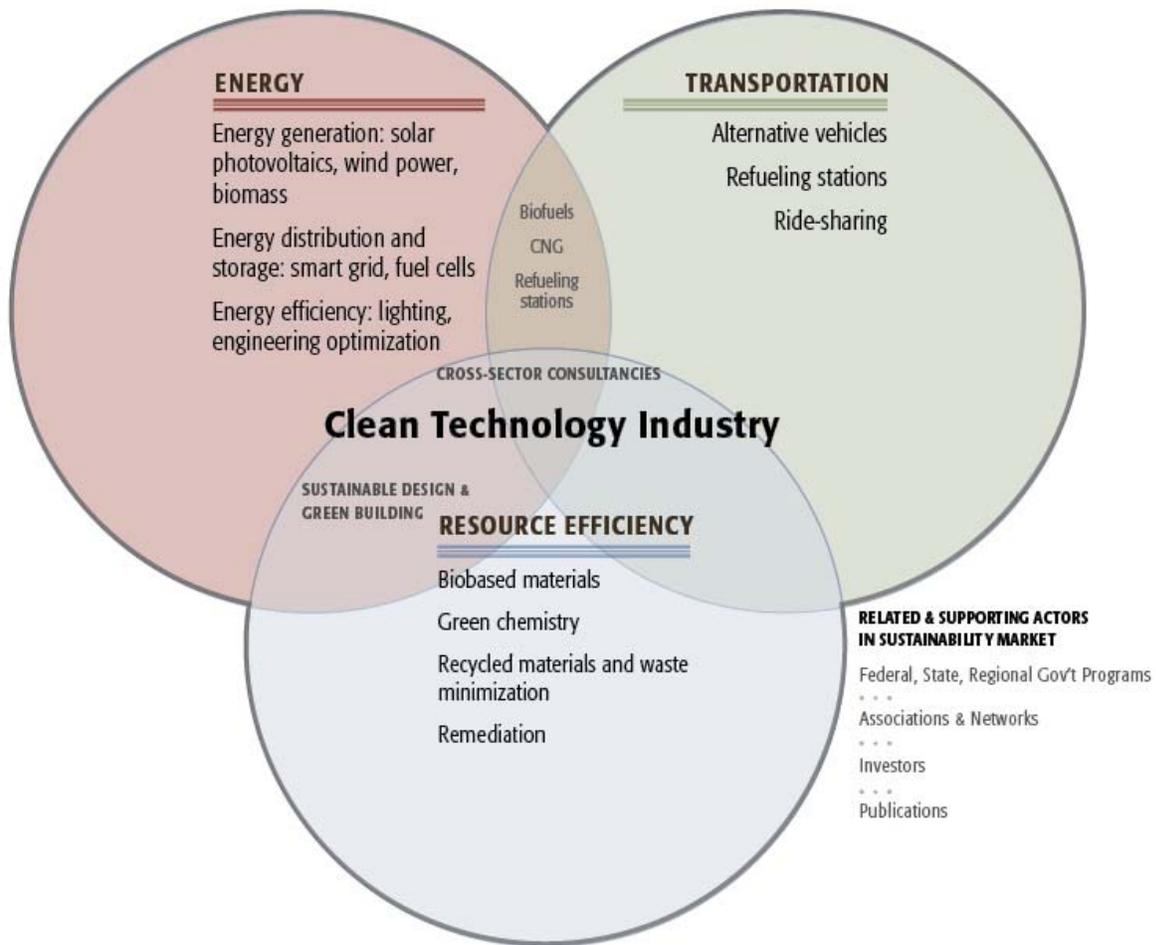
An example of this sector cross-over is seen in the production of Compressed Natural Gas (CNG) from biomass. Since CNG can be used for a variety of purposes, ranging from electricity generation in gas fired generators to fueling CNG vehicles, this sub-sector crosses over into both the Transportation and Energy sectors.

⁴ Clean Edge www.cleantech.com, 2008

⁵ Prosperity Partnership, *Clean Technology Cluster Initiatives*

Another example of a clean tech field with a significant amount of cross-over is Green Building and Sustainable Design, which is given special attention in this analysis because of its sizeable presence in the Puget Sound Region. This field exemplifies the challenges inherent in defining clean technology and the market forces that shape the industry as it draws on research and development and manufacturing skill sets from both the Resource Efficiency and Energy categories.

Exhibit 1
Clean Technology as Defined for this Report



Source: Berk & Associates, 2008

Supporting and Related Organizations. Organizations listed outside the overlapping circles in **Exhibit 1** are not considered a part of the clean technology industry for the purposes of this study. While the policy making, advocacy, business support, and publication work of these entities actively strengthen the clean tech industry, these organizations are not considered as part of the industry core.

Examples of such supporting and related organizations include:

- **Government Programs.** Washington State Department of Community, Trade and Economic Development (CTED), King County Link Up
- **Associations and Networks.** Washington Clean Technology Alliance, Puget Sound Clean Cities Coalition
- **Publications.** Clean Edge, Grist, Sustainable Industries Journal
- **Investors.** Northwest Energy Angels

II. CLEAN TECHNOLOGY INDUSTRY TREND ASSESSMENT

Introduction

This section examines national and regional trends for each clean tech sector in order to create a baseline understanding of the industry's current and future outlook, which will frame and inform the assessment of opportunities in clean technology for the City of Mountlake Terrace in **Section IV**. In particular, this section:

- Provides an overview of clean technology firms in the Puget Sound Region
- Identifies key indicators to track national, state, and regional trends in each clean technology sector

Clean Technology Firms in the Puget Sound Region

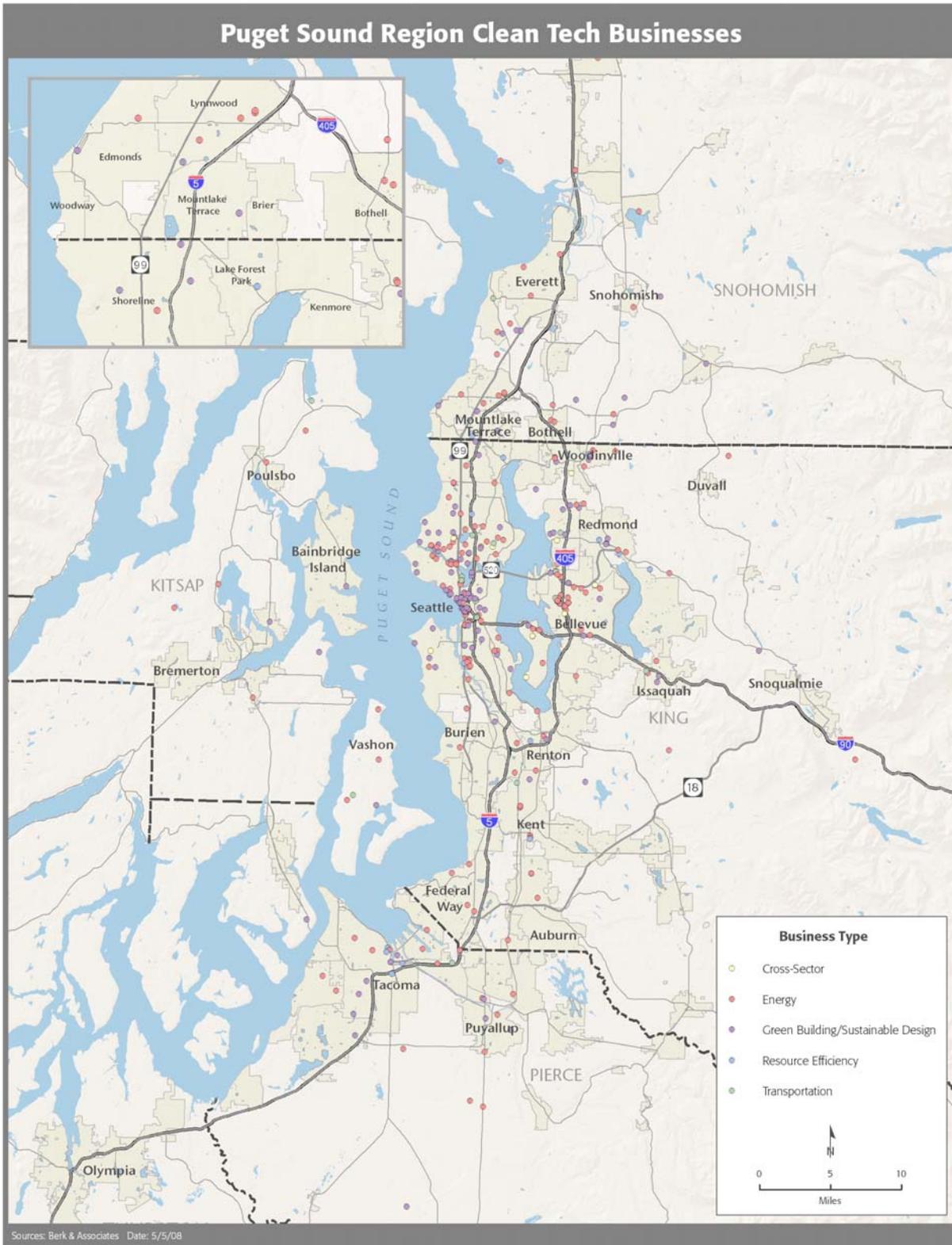
To establish a spatial sense of where clean technology firms are located in the Puget Sound, GIS analysis was conducted using three different inventories of clean technology firms in the Puget Sound Region. The three inventories are as follows:

- **Washington State Clean Tech Companies compiled by Innovative Strategies and Garvey Schubert Barer (May 2007)**. This inventory includes the names, contact information, and brief description of clean tech firms grouped in the following categories: Sustainable Design, Clean Energy and Renewable Fuels, Energy Efficiency, Water Conservation and Treatment, Waste Management: Recycling and Recycled Products, Environmental Protection and Remediation, and Services and Consultancies.
- **Directory of Renewable Energy, Energy Efficiency, and Sustainable Products and Companies by the Department of Community, Trade, and Economic Development (March 2008)**. This inventory includes the names, contact information, and brief descriptions of firms in 18 sub-categories.
- **King County Link Up Partners**. This is not an inventory, unlike the two previous sources, but rather is an online list of partners working with King County Link Up to expand markets for recycled materials.

It is important to note that each of these organizations uses slightly different definitions of clean technology and the firms and organizations they include in the industry. Berk & Associates has selectively edited firms from the following inventories to ensure the individual firms cataloged and shown in the map align with the definition of clean technology outlined in **Section I**.

Exhibit 2 presents a geographic distribution of the 460 clean technology firms in the Puget Sound Region, derived from the above sources. Again, depending on the clean technology definition and data sources, the number of firms may scale up or down.

Exhibit 2 – Puget Sound Region Clean Tech Business Map



Source: Berk & Associates, 2008

This map shows that:

- Seattle is home to a large number of clean technology firms, with a strong presence in the downtown Seattle area.
- Approximately half (227) of the Puget Sound Region's clean technology firms are located in Seattle, with the other half (238 firms), are located in surrounding communities.
- The region surrounding Mountlake Terrace is home to numerous energy and green building/sustainable design companies.

Energy Sector

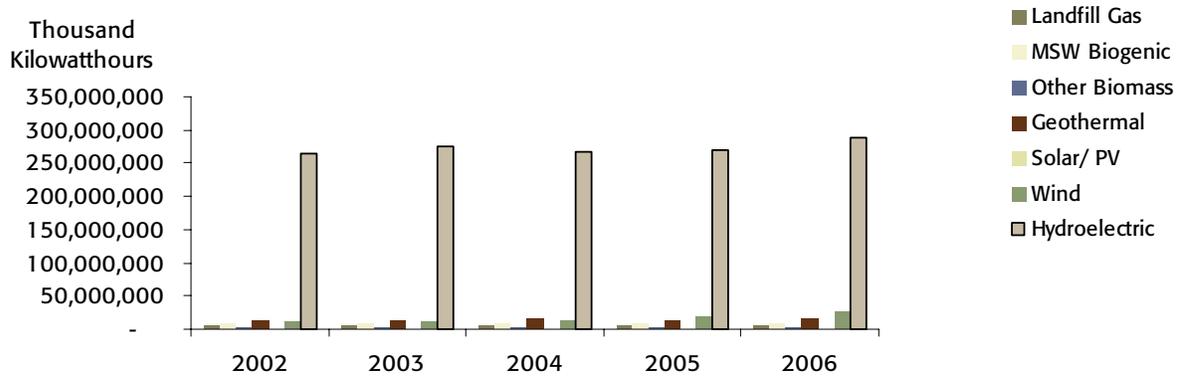
The Energy sector is composed of firms that focus on the generation, transmission, and conservation of energy. This definition covers the entire energy value chain, including non-traditional energy sources such as solar, wind, geothermal, and biomass, as well as innovative approaches to utilizing, storing, and transmitting traditional energy sources such as smart grid systems.

Alternative Energy Growth Trends

National Trends. Nearly all sectors in the energy category are growing nationally as shown in **Exhibit 3**. Electricity generation is often used as a measurement of growth in the clean tech energy sector because a diverse range of clean technologies focus on electricity generation.

Hydropower accounted for nearly 75% of all electricity generated from renewable resources in 2006. However, there is controversy surrounding how "clean" hydropower actually is. Critics of large scale hydropower often note the large amounts of methane and carbon dioxide produced by decaying biomass at dam sites and the environmental destruction produced from dam construction.

Exhibit 3 National Net Electricity Generation by Renewable Energy, 2002-2006



MSW biogenic refers to the use of Municipal Solid Waste to generate power.

PV refers to power generation through the use of photovoltaic cells.

Source: Berk & Associates, 2008 and Energy Information Administration, 2008

Regional Trends. Washington State and the Puget Sound Region face a unique set of advantages and disadvantages in the energy sector. Washington has been endowed with a generous amount of intermittent resources which differ from traditional sources of electricity generation such as coal or natural gas fired generators, in that they cannot be turned on or off at will. Hydro, solar, and wind power are all examples of intermittent resources.

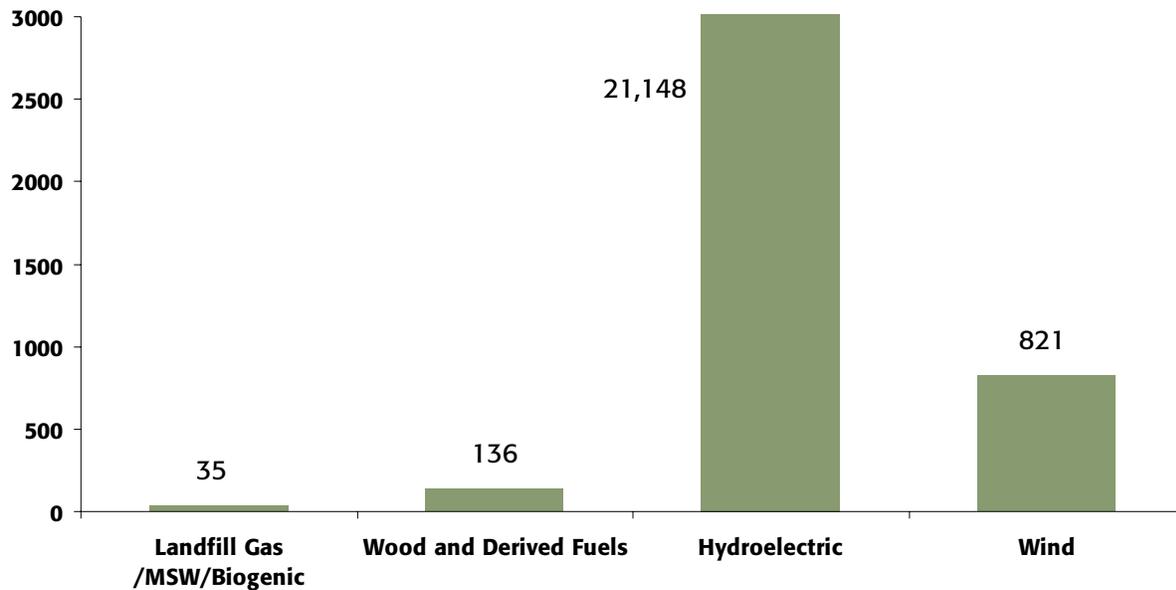
Exhibit 4 displays the strong presence of hydropower in Washington State, which leads the nation in hydroelectric generation with over 21,000 megawatts of net capacity.

The abundance of relatively inexpensive hydro-generated electricity has produced an extremely competitive market for other forms of renewable energy in the State and non-hydro renewables represent less than two percent of Washington State’s electricity generation.⁶ Wind power accounts for most of the electricity generated from other renewable sources.

⁶ Department of Community, Trade and Economic Development, 2007.

Exhibit 4

Renewable Electric Power Net Capacity by Energy in Washington (Megawatts), 2006



Source: Berk & Associates, 2008 and Energy Information Administration, 2008

Future Outlook for the Clean Tech Energy Sector

Energy will continue to be a driver of clean technology in Washington State and the Puget Sound Region as growing demand in international and regional markets continue to exert upwards pressure on energy prices. These market forces will be accelerated by industry and policymaker efforts to accelerate the growth alternative energy options, including:

Green Pricing. These programs allow utility customers to purchase a share of their energy from renewable sources by paying an additional fee. This subsidy helps utilities and developers to overcome the investment required to provide alternative energy sources. Washington State and the Puget Sound Region are leaders in green pricing with over 20 electric industry participants and over 30,000 residential participants as of 2005.⁷

Renewable Portfolio Standards. In 2006 Washington voters approved I-937. Under this initiative, utilities with more than 25,000 customers are required to meet 15% of their annual load with renewable energy sources by 2020. Renewable portfolio standards also provide a competitive edge to alternative energy providers by imposing a quota on energy supplies.

⁷ Energy Information Administration, 2008

The Transportation Sector

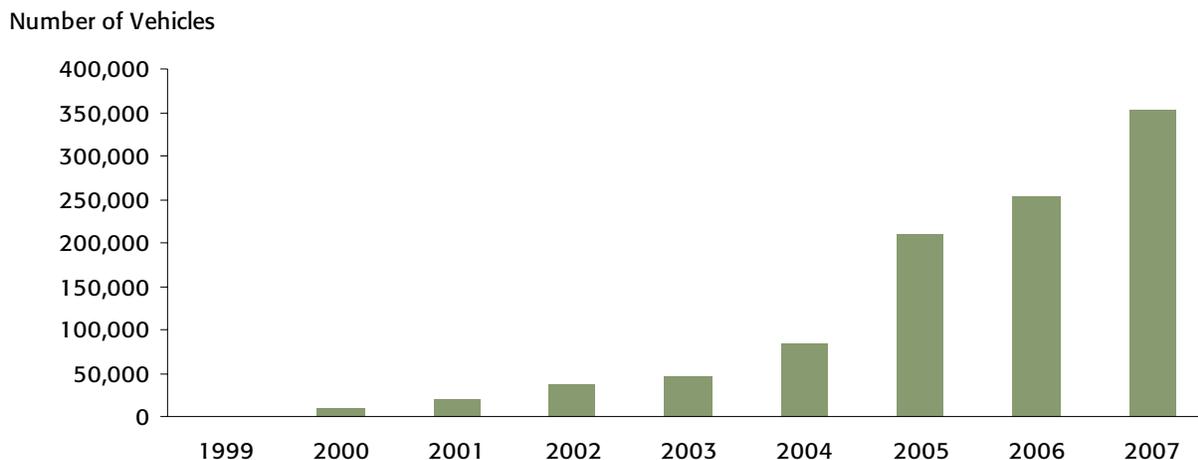
The Transportation sector of the clean technology industry is composed of firms focused on sustainable, efficient, and novel forms of transportation. Sub-sectors include: alternative-fueled vehicles, electro propulsion, hybrid-electric vehicles, hydrogen refueling stations, and ride-sharing technology.

Transportation Growth Trends

National Trends. The Transportation sector of the clean technology industry continues to grow as the nation aims to reduce its petroleum consumption through advanced clean technology and increased deployment of fuel efficient vehicles. Although hybrid electric vehicles are not considered as alternative fuel vehicles due to their continued use of gasoline, they are a worthwhile indicator to track because the technology is easily accessed by consumers and provides a measurable reduction of fuel consumed.

Exhibit 5 displays the growth of hybrid electric vehicles nationwide.

Exhibit 5
National Hybrid Electric Vehicle Sales, 1999-2007



Source: Berk & Associates, 2008 and Energy Information Administration, 2008

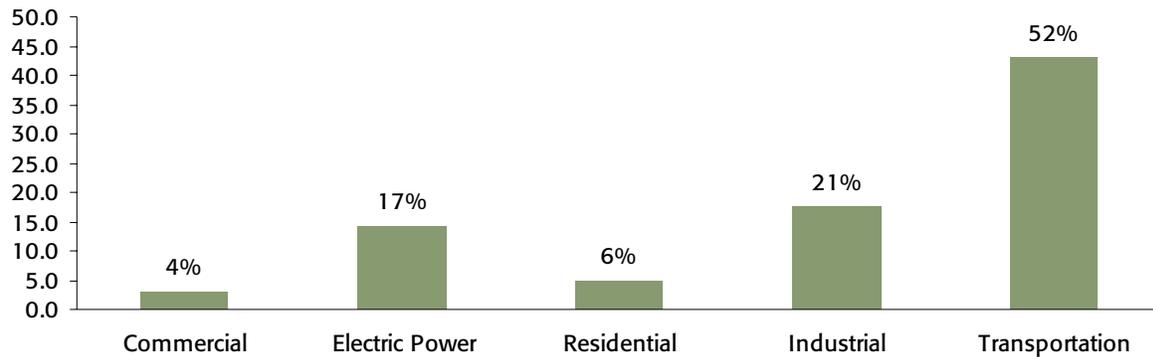
- Between 1999 and 2007, hybrid electrical vehicle sales in the U.S. increased by 246%.

Regional Trends. A confluence of factors has led to increased activity in and demand for clean transportation technology in the Puget Sound Region in particular. As rising fuel prices has created a demand for alternative vehicles and transit options, traffic congestion in the Puget Sound region has increased due to population growth and increased freight movement. At the same time, environmental concerns have spurred legislation stemming from transportation-created pollution.

Washington ranks seventh in the nation in hybrid sales with 8,650 registered hybrid vehicles. The State also ranks sixth in hybrid popularity with 1.38 hybrids per 1000 residents.⁸ As shown in **Exhibit 6**, transportation is the leading cause of carbon dioxide emissions in the State of Washington. In King County in particular 52% of greenhouse gas pollution comes from burning oil in cars and trucks.⁹

Exhibit 6
Washington State Carbon Dioxide Emissions by Sector, 2004

Million Metric Tons of
Carbon Dioxide



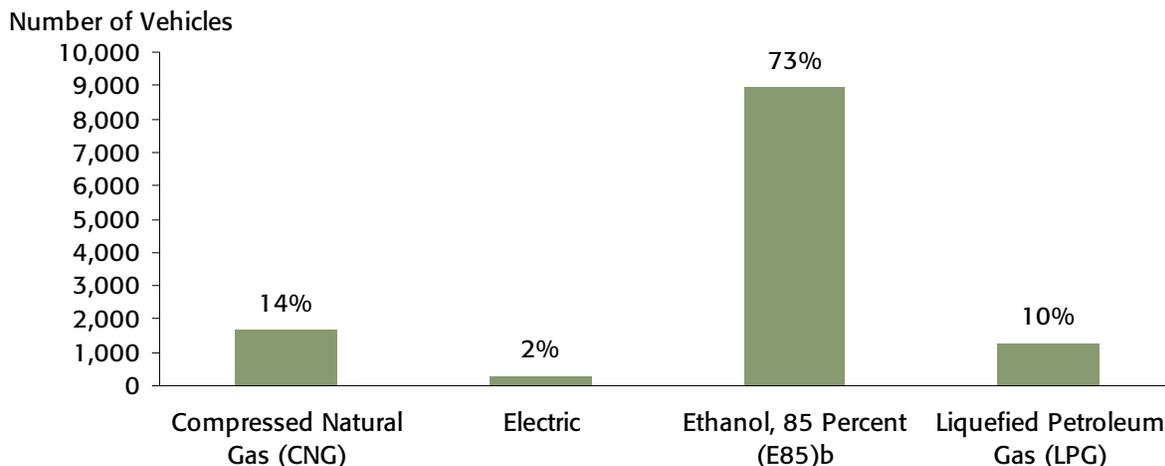
Source: Berk & Associates, 2008 and Energy Information Administration, 2008

Alternative Fuels. The Energy Information Administration defines “alternative fuels” as fuels that are substantially nonpetroleum, yield substantial energy security benefits, and offer substantial environmental benefits. Currently there are more than a dozen alternative and advanced fuels available. Although government-regulated and voluntary private fleets remain the primary users of these fuels, consumers represent an increasing share of alternative fuel users. Utilization of these fuels is critical to reducing dependence on foreign oil and improving air quality. The estimated number of total alternative fuel vehicles in Washington totaled 12,217 in 2005, and are categorized by fuel type in **Exhibit 7**. **Exhibit 8** shows the estimated consumption of alternative fuels in Washington State.

⁸ R.L. Polk & Co., 2007

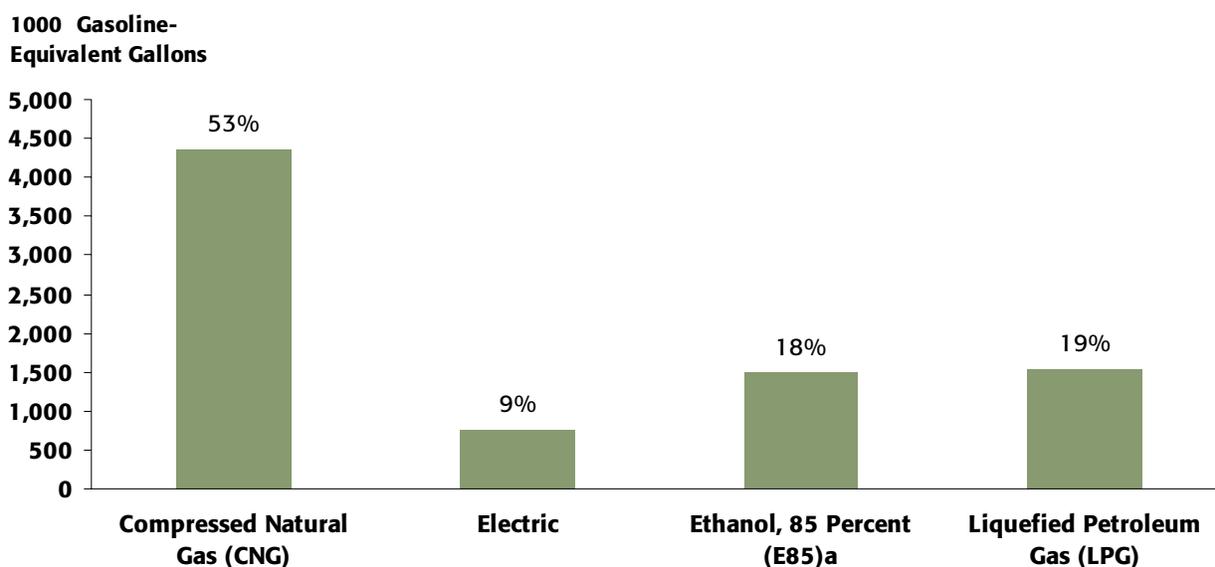
⁹ Green Car Congress, 2008

Exhibit 7 – Estimated Number of Alternative Fueled Vehicles in Washington, 2005



Source: Berk & Associates, 2008 and Energy Information Administration, 2008

Exhibit 8 – Estimated Consumption of Alternative Fuels in Washington, 2005



Source: Berk & Associates, 2008 and Energy Information Administration, 2008

Biodiesel. While not covered in the Energy Information Administration data presented in **Exhibit 8**, biodiesel has a strong presence in the Puget Sound Region with over 79 biodiesel stations in Washington and an estimated 2,000 Seattle area users. Recent concerns with the environmental and social impacts of biodiesel will likely encourage research into more attractive alternative fuels.

Alternative Fueling in the Puget Sound Fleet. Our interviews with stakeholders reveal that public agencies are the largest consumer of both alternative fuels and vehicles, followed by private commercial fleets. King County Metro currently has 214 hybrid busses and 149 electric trolley buses, with an additional 23 hybrid buses operating under contract to Sound Transit. In addition to King County's efforts, Pierce County Transit's fleet is composed of 250 CNG busses making it an all green fleet and the City of Seattle has 250 hybrid vehicles and is expanding its fleet.

Future Outlook for the Clean Tech Transportation

Demand for clean technology solutions aimed at solving transportation problems will likely continue to grow and spread to other sectors as the congestion, fuel costs, and environmental concern increase. In the short term, the public sector will likely remain the largest consumer of alternative fuels and vehicles.

Resource Efficiency and the Green Building Sub-Sector

Our definition of the Resource Efficiency sector includes the practice and technology of making processes more efficient, sustainable, and less invasive. Resource efficiency results in:

- Reduced solid waste
- Improved air and water quality
- Increased life-cycle efficiency and economic performance
- Reduced strain on local infrastructure

Sub-sectors of the Resource Efficiency sector include: biobased materials; biometrics; green chemistry; phytomediation; recycled materials; lighting; combined heat and power; engineering optimization; efficient heating, ventilation and air conditioning (HVAC); biological water filtration; and hazardous waste minimization.

Green Building is also included here as a separate sub-sector due to the fact that the cross-over between Energy and Resource Efficiency is so sizeable and because the Puget Sound Region is home to many industry leaders. National spending in Green Building is expected to be around \$12 billion in 2008 and is projected to increase to \$60 billion by 2010.¹⁰

Resource Efficiency and Green Building Growth Trends

National Trends. The increasing costs arising from water, air, and solid waste issues has resulted in an upwelling of clean technology focused on improving efficiency and reducing waste. Nationwide material recovery and hazardous waste minimization has continued to grow, with

¹⁰ McGraw-Hill Construction Analytics, *SmartMarket Trends Report*, 2008

materials recovery for recycling and composting growing by four and six percent respectively between 2000 and 2006.¹¹

The Green Building sector also serves as an excellent measurement of growth because many of the technologies developed in the Resource Efficiency sector are employed in Green Building. By 2010, the Green Building products national market is expected to be worth \$30-40 billion annually.¹²

Regional Trends. The Resource Efficiency sector is well-represented in the Puget Sound region. The Puget Sound Region is home to a variety of waste remediation, engineering optimization, and efficient lighting firms, with 38 firms in the Resource Efficiency sector. Employment concentration in solid waste combustion and materials recovery in the Puget Sound is five and three times the national average respectively.¹³

These private sector efforts are buttressed by supportive public policy. For example, the City of Seattle's waste management program set a new record for recycling rates in 2006, with nearly 50% of the city's residential, commercial, and self-haul waste heading into recycling bins instead of landfills.¹⁴

Green Building. Buildings are one of the largest consumers of energy nationwide and account for nearly 40% of all carbon dioxide emissions.¹⁵ Buildings are also large consumers of water and other materials, and produce significant amounts of waste due in the construction phase. These factors make Green building an attractive target for innovative clean technology growth. The public sector is encouraging these trends by supporting the green building sector, adhering to green building standards for public construction, and, in some cases, requiring that private sector development meet these standards as well. For example, in 2006, the City of Seattle updated development regulations to provide greater heights and/or maximum floor area for commercial and residential buildings in the central office core and adjoining areas. In order to reach the new height or density requirement, projects must achieve a LEED silver rating.¹⁶

¹¹ Environmental Protection Agency, 2006

¹² Green Building Alliance, 2008

¹³ Prosperity Partnership, 2005

¹⁴ City of Seattle, 2008

¹⁵ *U.S. Energy Information Administration, U.S. Department of Energy. EIA Annual Energy Review 2005, 2008*

¹⁶ City of Seattle, City Green Building Development Incentives

LEED Certification. LEED certification for buildings serves as a good measure of green material use and green building trends in commercial buildings in the region. There are four levels of LEED classification: certified, silver, gold, and platinum. **Exhibit 9** shows the geographic location from LEED certified buildings in the Puget Sound region, showing the concentration of LEED buildings in the City of Seattle.

Built Green Certification. Built Green certification for residential buildings is classed on a scale of one to five star depending on how high the building ranks in regards to site and water protection, energy and materials efficiency, and air quality.

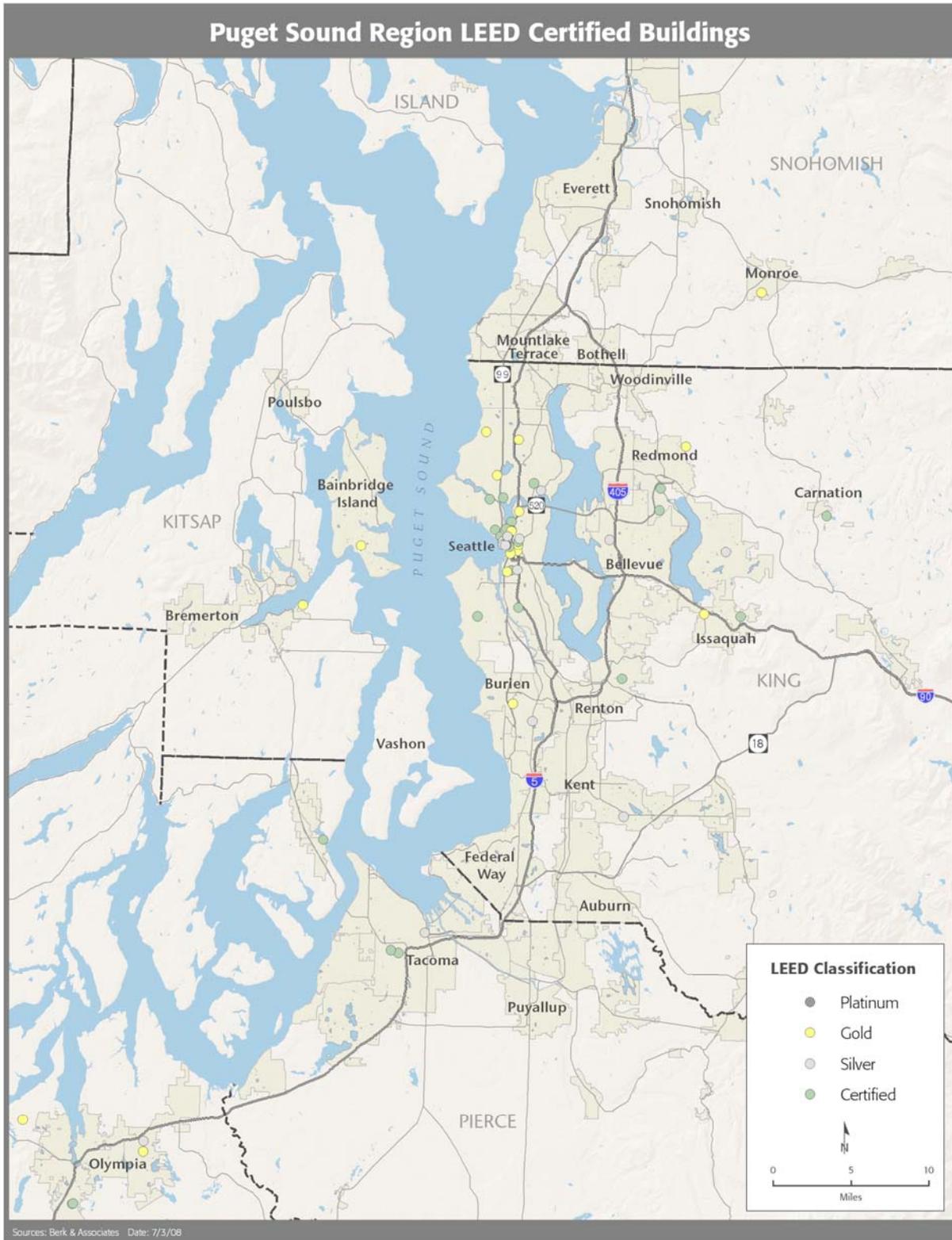
The **Leadership in Energy and Environmental Design (LEED)** Green Building Rating System, developed by the U.S. Green Building Council, is a third-party certification program and the nationally accepted benchmark for the design, construction, and operation of high performance green buildings.

(Source: U.S. Green Building Council, <http://www.usgbc.org/>)

Built Green is an environmental residential building program of the Master Builders Association of King and Snohomish Counties, developed in partnership with King County, Snohomish County, and other government agencies in Washington State to incorporate environmentally-friendly practices in residential construction. Built Green is designed to help homebuyers find quality, affordable, and “green” homes using a four rating systems for homebuilders, remodels, multifamily, and communities or developments.

(Source: Built Green, <http://www.builtgreen.net/>)

Exhibit 9 – LEED Certified Buildings in the Puget Sound Region



Source: Berk & Associates and U.S. Green Building Council, 2008.

- The largest cluster of LEED certified buildings in the region are located in and nearby Seattle. Of the 88 LEED buildings in the State, approximately 40% are in Seattle.
- Mountlake Terrace and neighboring cities currently do not have any LEED certified buildings.
- Buildings with ratings of LEED certified, silver, and gold are found in the region, but not the the highest rating of LEED platinum.

Exhibit 10 lists the total number of Built Green certifications in selected cities in King, Snohomish, and Pierce Counties, as well as Built Green certified new units as a percent of total new housing units permitted from 2001 to 2006.

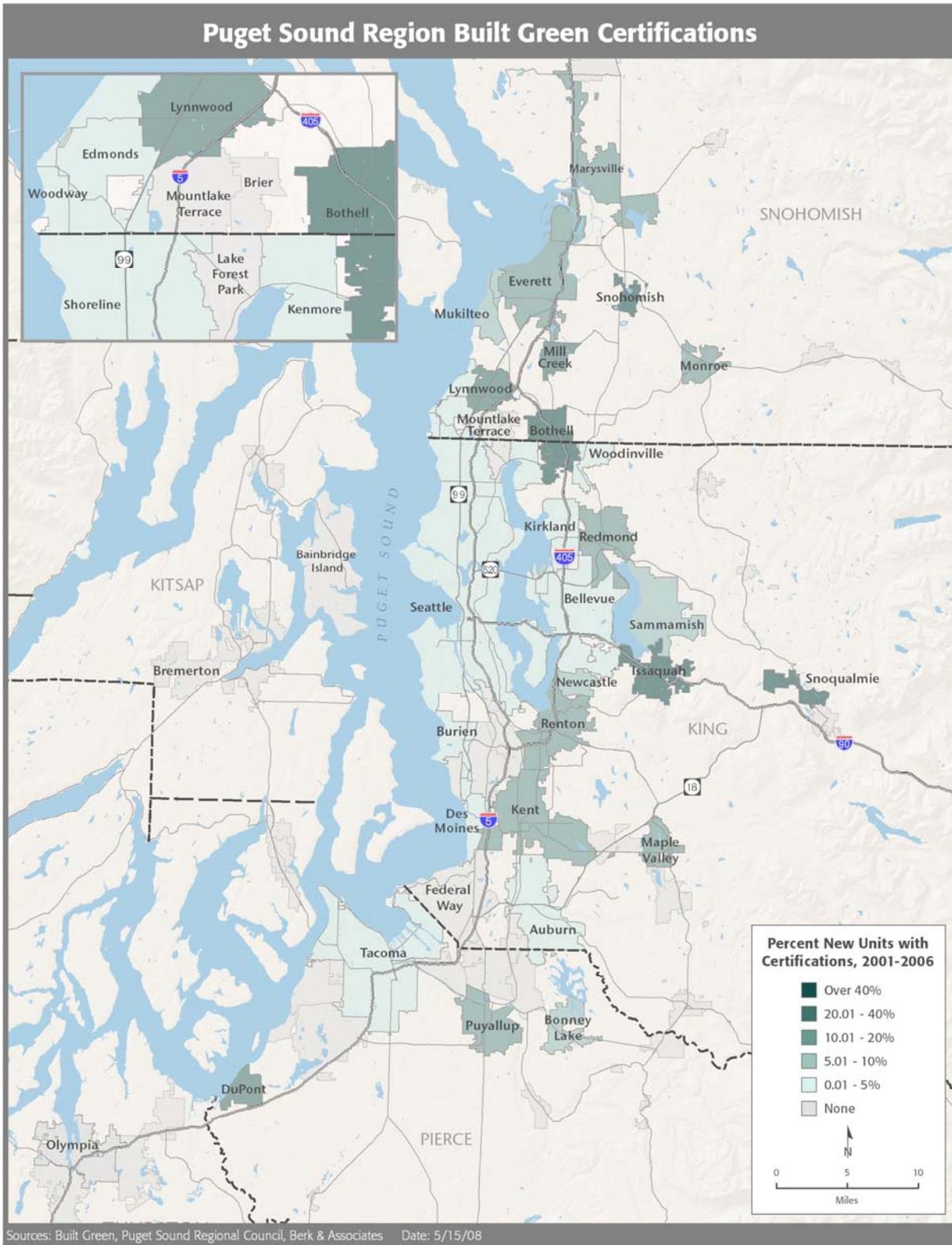
Exhibit 10
Built Green Certifications in Puget Sound Region

	Green Built Certifications	New Housing Units Permitted	Percent New Units with Certifications
KING	4,876	43,556	11%
Issaquah	1,330	3,301	40%
Seattle	1,213	32,940	4%
Snoqualmie	933	1,664	56%
Bothell	758	1,166	65%
Renton	642	4,485	14%
PIERCE	271	7,871	3%
Puyallup	174	1,181	15%
Bonney Lake	94	1,789	5%
Tacoma	2	4,901	0%
Fox Island	1	-	0%
SNOHOMISH	1,265	7,120	18%
Everett	332	3,027	11%
Mill Creek	308	1,058	29%
Lynnwood	241	934	26%
Marysville	233	1,874	12%
Snohomish	151	227	67%

Source: Berk & Associates, 2008 and Master Builders Association of King and Snohomish Counties, 2008

Exhibit 11 demonstrates the geographic distribution of Built Green certified units as a percentage of total new units permitted from 2001 to 2006.

Exhibit 11 – “Built Green” Buildings in Washington State



Source: Berk & Associates, 2008 and Master Builders Association of King and Snohomish Counties, 2008

There have been no new units with Built Green certification in the City of Mountlake Terrace. In part, this can be explained by the small growth in housing units. According to the Washington Office of Financial Management, Mountlake Terrace had a three percent change in housing units from 2000 to 2007. Built Green certified units in the neighboring cities of Lynnwood and Bothell make up 26% and 65% of new units respectively.

Future Outlook for the Clean Tech Resource Efficiency and Green Building Sector

Resource Efficiency and Green Building will likely continue to grow in the Puget Sound Region due to heightened residential demand for green construction, improvements in sustainable materials, and increasing public sector support.

III. INDUSTRY LEVEL CHALLENGES AND NEEDS

This section examines the needs and challenges faced by many clean technology firms in the three industry sectors described above. These challenges may be considered in three main categories:

- **Firm Capacity Building Challenges:** Like other businesses, clean technology firms need workers and capital to grow and succeed. Obtaining the right workers and sufficient capital can be particularly challenging for clean technology firms given the need for specialized workers already in high demand and significant capital requirements in a competitive market.
- **Market Challenges:** Because clean technology is a rapidly evolving industry, uncertainties regarding market demand, industry definition, and consistent standards can create challenges for clean tech firms.
- **Government and Public Policy Challenges:** Government policy may intentionally or unintentionally hinder the growth of clean technology through unfamiliarity with the industry.

These industry-level needs and challenges were identified through a series of stakeholder interviews with business owners, investors, and trade group officials in the clean technology industry and will inform the strategies that Mountlake Terrace can employ to attract and retain clean tech firms in **Section IV**. For a complete list of the interviewees, methodology, and comments that informed this section, see **Attachment A**.

Firm Capacity Building Challenges

Access to Qualified Workforce. Access to a qualified workforce is central to the maintenance and growth of any economic sector. Given the projected growth, specialized skill sets, and interdisciplinary nature of the clean tech sector, attracting, training, and retaining the right workers is particularly challenging for firms in this area.

- **Expected Industry Growth.** While it is difficult to predict green job growth, there is a general consensus that there will be job growth in clean technology. A study of clean technology jobs in the Puget Sound Region found that between 1997 and 2004 clean technology jobs increased by 72%.¹⁷
- **Workforce Training/Retraining.** In addition to job growth, there will be significant new skill development within the clean tech industry and related industries, and large incumbent firms will be transitioning their workforce to work in the emerging clean technology environment. For example, as utilities struggle to bring in new employees to replace an aging workforce, these workers will need to be familiar not only with the skills required to perform current jobs, but will also need to be trained to work with emerging clean technologies.

¹⁷ Department of Community, Trade and Economic Development, 2005.

- **Competition for Qualified Workers.** Chemical, electrical, and computer engineers are in high demand by nearly all sectors in the marketplace. Attracting workers with these skill sets is a challenge for clean tech firms because the skills these workers possess are needed not only by clean tech businesses, but also by firms in other sectors with a strong Puget Sound presence including aerospace, information technology, and life sciences.

Access to Capital. Given that much of clean technology originates from start-up firms, the industry is particularly susceptible to volatility as investors shy away from riskier investments during periods of market turbulence. A steady flow of venture capital is the lifeblood for start-up clean technology firms. In 2007, \$2.5 billion was invested nationally, but competition between firms and among states is strong. Washington ranked third in clean tech venture funding in 2007, with a total of \$175 million, behind California (\$1.4 billion) and Massachusetts (\$272 million).¹⁸

Clean tech businesses face particular challenges in this competition for capital for several reasons:

- **Significant Capital Investments.** Many clean technology firms require more capital-intensive investment than other technologies, such as software.
- **Long Development Timelines.** Compared to start-ups in more established industries, clean technology firms often face longer development periods until they reach profitability. This can be a deterrent to investors and also can result in more demanding equity requirements.

Energy Volatility and Pricing. Alternative energy markets are particularly susceptible to price volatility in fossil fuel energy markets. As the profit margins in alternative energy projects are often very slim, even small fluctuations in energy prices can reduce incentives to invest in alternative infrastructure, markets, or technologies, though this competition is expected to diminish over the long-term as traditional energy sources become more scarce.

- **Competition with Hydro-Power.** Energy prices are relatively inexpensive in the Northwest due to the abundance of hydro-power. This makes other forms of renewable energy generation less competitive here relative to other areas in the country with higher energy costs.
- **Volatile Feedstock Costs for Biofuels.** The “food versus fuel” debate is intensifying due to rising food prices. As competition for the use of arable land increases, biofuels that rely on feedstock derived from food sources will face increasing competitive pressure.

¹⁸Ángel González, “Clean-tech startups gain more VC green,” *Seattle Times*, 29 February 2008.

Market Challenges

Lack of Consistent, Well-Defined Standards. A related challenge arising in the clean technology sector is the prevalence of “green-washing” as a marketing tool for a wide range of products, some of which likely have little or no environmental merit. A lack of standards in what qualifies as a green product is ultimately harmful to the clean tech industry, consumers, and the environment.

Demand and Distribution Access. Given the research and infrastructure investment required to bring new clean technologies to market, at their introduction clean tech products may be significantly more expensive than more traditional alternatives. Technologies in some sectors may not be cost-competitive until several years after they have been introduced. As with other new technologies, these high costs may constrain demand, with relatively few consumers serving as early adopters of the product.

A related challenge is a lack of infrastructure to support the distribution and use of some clean technologies. This challenge is visible in the pipeline problems faced by biodiesel producers, who have difficulty accessing traditional fuel distribution channels. The increase in demand for clean technologies has resulted in lengthy lead times for critical components used by clean technology producers.

Market Maturation and Increasing Competition. As areas of the clean technology market become more mature, smaller firms that have borne much of the risk associated with developing new technologies will face stiff competition from larger, more traditional energy and transportation firms.

Government and Public Policy Challenges

Lack of Familiarity of Clean Technology. Just as consumers may be confused about clean technology processes and technologies, an incomplete understanding of this emerging field also affects regulators and permitting offices. Well-intentioned officials may inadvertently slow the implementation of new technologies due to unfamiliarity with the processes or materials involved. In particular, clean technologies may have an exotic or dangerous reputation and a corresponding tendency to over-regulate may stifle innovation. The production of biofuels, for example, is often misunderstood as dangerous, invasive, or damaging to property values.

Awareness of and Access to Incentive Programs. National, state, and local tax incentives, grants, and low interest loans can help firms and consumers overcome the expensive nature of many newly introduced clean tech products as described above. Our research suggests, however, that clean technology firms are often not aware that such incentive programs exist in their area of focus. Furthermore, if awareness *does* exist, consumers and firms may have a difficult time negotiating the complicated procedures necessary to successfully access incentive funding dollars.

IV. MOUNTLAKE TERRACE OPPORTUNITY ASSESSMENT

As part of its economic development efforts, the City of Mountlake Terrace is assessing opportunities to attract clean technology businesses. This business attraction will occur within the larger context described in the preceding sections of this report, including the rapid growth of the industry and its component sectors, as well as the industry's overall challenges and needs. This section describes the City's market position, constraints, and opportunities for action that will determine the City's ability to attract and retain clean tech firms.

Firms make their location decisions based on a nested series of considerations and our discussion of Mountlake Terrace's opportunities in this section parallels these factors.

- First, firms see Mountlake Terrace in the context of its geographic location, including its proximity to the regional clean tech industry, and community character.
- Second, firms evaluate the availability of appropriate land or office space within the City. This evaluation may, in turn, limit the kinds of businesses that can choose to locate there.
- Finally, firms are affected by local governments' responses to the industry-level challenges described in **Section III**. This third area represents important opportunities for Mountlake Terrace to differentiate itself from communities that are similarly located and offer similar development opportunities. While access to capital, workforce availability, regulation, and other considerations are the same in any city close to Seattle, an individual jurisdiction may establish policies or provide resources that make it stand out from the crowd as a more attractive home for clean tech businesses.

Mountlake Terrace's Geographic Location and Character

Mountlake Terrace is a suburban city close to Seattle, the center of the Puget Sound Region's clean tech industry. Mountlake Terrace is an attractive residential community with good schools, good city services, and distinct business districts including neighborhood oriented retail east of I-5 and more auto-oriented retail west of I-5 and in the Gateway district. With a 2006 jobs-to-housing ratio equaling 0.76, clean technology presents an opportunity to strengthen Mountlake Terrace's employment base.

Proximity to Seattle. Mountlake Terrace is about a 20-minute car ride away from downtown Seattle, allowing firms to draw from a large, highly educated work force. In addition to a local labor pool to draw upon, the demand stemming from Seattle for clean technology is significant and close to Mountlake Terrace. The presence of other clean technology firms in the area allows for information-sharing opportunities.

Transportation Options. As congestion increases throughout the Puget Sound Region, the length and ease of commute have become a significant decision variable for firms when deciding where to locate. Mountlake Terrace's proximity to I-5 and I-405 were cited as positives by several clean technology stakeholders. Alternative transit options provided by employers such as telecommuting and off-peak commuting, as well as resources provided by the public sector, such as mass transit, play an increasingly important role in location decision-making.

All of these factors should enable Mountlake Terrace—and other similarly positioned cities—to benefit from the regional economic activity in this sector, by directly housing clean tech businesses, housing related and supporting businesses, or by having employees of clean tech businesses live in the city.

Site Availability and Cost

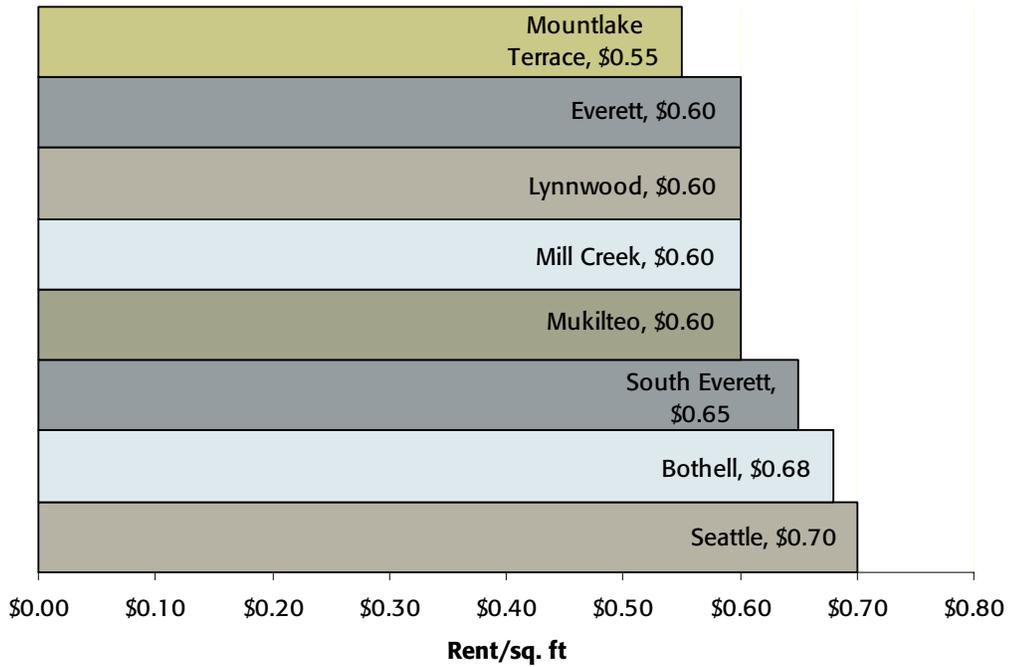
Site availability and cost are important factors in business location decisions that can limit the kinds and number of businesses a city can attract.

Clean Tech Needs. The space needs of clean technology firms vary, depending on the sector and business function along the value chain. The following site features were cited through our interviews with regional clean tech stakeholders:

- Most firms in the clean technology sector need between 1,000 and 15,000 square feet for office space.
- Service orientated clean technology firms usually require less office space (1,000 – 7,000 square feet) than clean technology firms that incorporate R&D into their business model.
- Parking and loading zones are important external site features.
- Flexibility to remodel and restructure office space to accommodate special functionality needs and growth is desirable.
- While important, basic infrastructure such as power and broadband access, is considered a given in cities around the Puget Sound Region.

Site Cost. The cost of rent greatly influences clean tech location decisions given the start-up nature of many firms in the sector. **Exhibit 12** and **Exhibit 13** show the average lease rates for industrial and office space in Seattle, Mountlake Terrace, and cities comparable to Mountlake Terrace in size and location. Mountlake Terrace has lower average rental rates than Seattle and many smaller cities in the Puget Sound Region. This is clearly an advantage for the City in attracting clean tech and other technology start-ups. Furthermore, Mountlake Terrace has a light industrial/office park zone that is particularly suitable to clean tech businesses in the Melody Hill Subarea. Some clean tech may also be suitable in the downtown zone or other commercial districts.

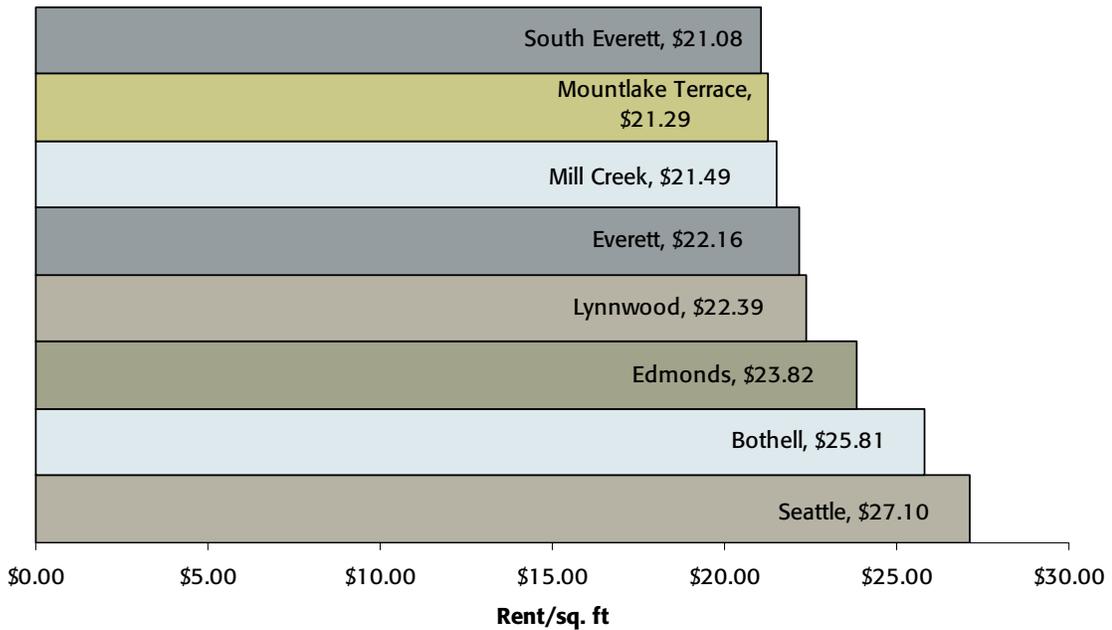
Exhibit 12 – Average Lease Rates for Industrial Space



Source: Berk & Associates, 2008 and Colliers International, 2007

- Mountlake Terrace has lower average lease rents than Seattle by \$0.15 per square foot. Among cities of comparable size and location, the City has the lowest average industrial lease rates.

Exhibit 13 – Average Lease Rates for Office Space



Source: Berk & Associates, 2008 and Colliers International, 2007

- Mountlake Terrace again has significantly lower rent per square foot for office space than Seattle, and offers competitive rates when compared with other similar cities.

Availability. An inventory of the City's buildable land was assembled from Snohomish County's Buildable Land Tables and is presented along with calculated potential square footage in **Exhibit 14** by district.

Exhibit 14
Mountlake Terrace Buildable Lands Summary

	Buildable Acres	FAR	Potential SF
Community Business	6.5	0.25	70,785
Downtown Community Business - A	2.4	0.25	26,136
Downtown Community Business - B	2.1	0.25	22,978
Downtown Community Business - C	14.8	0.25	161,390
Downtown Community Business - D	14.0	0.25	152,678
Downtown Community Business - E	7.4	0.25	80,804
General Commercial	7.7	0.84	282,478
Freeway/Tourism	3.5	0.29	44,466
Special Development District	0.4	0.19	3,062
Total Commercial	58.9		844,777
Light Industrial/Office Park	13.5	0.29	173,017
Total Buildable	72.38		1,017,794

Source: Berk & Associates, 2008 and Snohomish County Buildable Lands Summary Tables, 2007

- Mountlake Terrace offers several areas with potential sites with more than 100,000 square feet of buildable lands, particularly in the General Commercial Downtown Community Business areas C and D. These areas are best suited for clean technology firms with office space needs.
- The Melody Hill area in the northwest corner of Mountlake Terrace is the only portion of the city that is zoned light industrial and has re-developable parcels, making it the only option for clean technology firms engaged in research and development or manufacturing.
- Much of the city's buildable land is fragmented, meaning parcels are held by separate owners and are not contiguous. This ownership pattern makes larger scale development considerably more difficult than in situations where large blocks of buildable land are held by single owners.

Mountlake Terrace Clean Technology Opportunities. Mountlake Terrace's buildable land supply makes it most suitable for smaller, office-oriented clean technology businesses. This could include smaller start-up firms in the Energy, Transportation, or Resource Efficiency sectors that do not require significant industrial space. Additional opportunities for the city may be founding attracting supporting service-focused firms, such as consultancies or specialized technicians.

Opportunities for Differentiation

In competing for a share of the clean tech market with comparable cities around the Puget Sound Region, Mountlake Terrace can differentiate itself by addressing the needs and challenges that face clean technology firms (described in **Section III**). This can be accomplished through supportive public policy and customized business support services, and by cultivating an image as a “green” community through policy, action, and promotion.

Exhibit 15 summarizes the challenges faced by clean technology firms and the actions that Mountlake Terrace can take to make it more a more attractive home to such businesses. The purpose of this list is to identify the areas where Mountlake Terrace can expect to have a meaningful impact on the decision-making calculus of clean technology firms as they make their location decisions. These strategies also compliment the City’s **Sustainability Strategy** and more general economic vitality efforts.

Exhibit 15 Mountlake Terrace Opportunities

Clean Tech Business Attributes & Challenges	↔	Supportive Local Government Actions
<ul style="list-style-type: none"> • Firm Capacity Building Challenges: <ul style="list-style-type: none"> ◦ Access to qualified workers ◦ Access to capital ◦ Energy volatility and pricing 	↔	<ul style="list-style-type: none"> • Supportive Public Policies: <ul style="list-style-type: none"> ◦ Provide financial incentives ◦ Streamline permitting and incentive processes
<ul style="list-style-type: none"> • Industry Market Challenges: <ul style="list-style-type: none"> ◦ Lack of consistent, well-defined standards ◦ Demand and access to markets ◦ Market maturation and increasing competition 	↔	<ul style="list-style-type: none"> • Customized Business Support Services: <ul style="list-style-type: none"> ◦ Have knowledge and understanding of unique needs, circumstances and attributes of clean tech businesses ◦ Provide customized support for clean tech businesses ◦ Facilitate connections to resources and other partners ◦ Promote city services and regional assets
<ul style="list-style-type: none"> • Government and Public Policy Challenges: <ul style="list-style-type: none"> ◦ Lack of familiarity of clean technology and its more innovation techniques ◦ Awareness and access to incentive programs 	↔	<ul style="list-style-type: none"> • Cultivate Green Image & High Quality of Life: <ul style="list-style-type: none"> ◦ Create demonstration projects ◦ Use clean technology locally ◦ Take actions toward achieving greater sustainability and promote the City’s progress ◦ Encourage community attributes (walkability, connectivity) that enhance quality of life

Supportive Public Policy

Supportive public policy is critical to the development of clean technology on a national, statewide, and local level. While much of the policy affecting the clean tech industry happens at the federal and state level, the City of Mountlake Terrace can employ economic development strategies targeted at the attraction of clean tech firms, including the following:

- **Provide financial incentives.** Fee reductions can support the clean technology industry by offering incentives to both clean technology firms and consumers
- **Streamline permitting and other business processes.** A simple and quick permit process for clean tech businesses is another incentive technique that also sends a strong message that the City is committed to supporting clean technology. Creating a one-stop shop that integrates permitting and incentive processes helps achieve a high standard of services.

It is important to note that these strategies in particular require investment of City resources and so may not be feasible in the short-term.

Business Support Services

Closely related to supportive public policy is the provision of high quality, personalized business support services to clean technology firms and consumers. These services are most effective if they are done in ways that mitigate and streamline the problems that most often hamper the implementation and development of clean technology. The City can differentiate itself from comparable cities in the region by employing staff that have knowledge and understanding of the clean technology industry and are capable of facilitating connections between clean tech businesses and relevant resources. Components of an effective business support service could include:

- **Have knowledgeable City staff.** Employing staff with an understanding of the clean technology market can enhance the customer service experience provided by the City. This could mean having staff that is informed about recent regional trends or pending legislation or that have specialized expertise areas, such as a familiarity with green building procedures, materials, and certification.
- **Provide customized support.** City staff could provide hands-on service to assist clean tech businesses and consumers with grant applications, tax credit forms, and accessing federal, state, and local financial incentive programs.
- **Facilitate connections.** By providing useful information and connecting clean tech businesses to other resources and partners, the City can help address the needs of clean tech firms without significant expenditure of its own resources. For example, given the workforce shortage cited in **Section III**, the City can provide information through its website to facilitate the development of clean tech jobs. The City could also help connect clean technology employers with qualified employees through technology and job fairs.
- **Promote the City's services and regional assets.** By hosting technology fairs and other such events to promote the region and marketing its own specialized business support services, Mountlake Terrace could differentiate itself from its neighbors and encourage clean tech businesses to locate within the City. Information packets and web pages could be used as a recruitment tool.

Green Image and Values

Clean tech stakeholders consider a green image to be a desirable city attribute that could positively affect clean tech business location decisions. People employed in the clean technology sector often possess skill sets that could command higher wages in different sectors. One of the reasons these people choose to work in the clean technology sector is because the goals of clean technology firms may align with their personal core values. These people want to combine their personal values with where they work and live, and so seek site locations in communities with similar values.

To cultivate its green image, Mountlake Terrace can do the following:

- **Create demonstration projects.** This image can be cultivated through sustainable demonstration projects. For example, Mountlake Terrace's Town Center development is an opportunity to demonstrate the City's commitment to sustainability through the use of smart growth, low stormwater impact development, and green building techniques.
- **Use clean technology locally.** In addition to larger-scale demonstration projects using clean technology—such as efficient, green municipal buildings and a clean city vehicle fleet—demonstrates the City's commitment to sustainability and clean technology.
- **Take action that supports community sustainability and promotes the City's progress.** To cultivate a green image, the City has to take direct action that makes it a greener, more sustainable community. The development and implementation of the City's *Sustainability Strategy* is an integral part of this process. In addition to planning and direct action, the City should promote its progress through marketing and the development and reporting of key performance indicators.

Quality of life

The attraction of a desirable clean tech business to a city like Mountlake Terrace may occur idiosyncratically, through the preferences of a single entrepreneur who calls Mountlake Terrace home and chooses to locate his or her start-up nearby. Entrepreneurs often locate their offices near where they live and near where their employees live or want to live. Residential quality of life, including attractive homes and schools, walkable neighborhoods, alternative transportation options, high quality parks and recreation options, and convenient shopping, are all important economic development consideration for Mountlake Terrace.

Technology workers typically have choices about where they live and are a fluid workforce. High quality of life, including a dynamic and diverse cultural life are important characteristics of communities that are successful in capturing these members of the "creative class."¹⁹

¹⁹ Richard Florida, *The Rise of the Creative Class*, 2002

Conclusion

Despite recent market volatility, clean technology is anticipated to see rapid growth. This growth is forecasted to continue from a global sector valued at more than \$75 billion dollars in 2007 to more than \$250 billion in 2017.²⁰

The State of Washington and the Puget Sound Region is poised to continue to see growth in the clean tech industry. As a part of the region, the City of Mountlake Terrace is well-positioned to attract smaller-scale, service-oriented clean tech businesses in all three clean tech sectors by differentiating itself with supportive, customized policy and business support services and a demonstrated commitment to green values.

It is important to note that any such clean technology economic development strategy pursued by the City should be sufficiently diversified given that the clean technology market is still emerging and relatively immature. Diversification among sectors within the clean tech industry provides the best hedge against the bust-boom cycle seen in other young industries like high-tech. Furthermore, clean technology is still a small industry with a small number of jobs in the region. Actions to attract clean technology firms should be an integrated part of a broader economic development strategy to foster and sustain a vibrant City economy.

²⁰ Clean Edge, 2008.

ATTACHMENT A – Stakeholder Interviews

This interview summary encompasses the results of stakeholder interviews conducted from mid-March to Mid-April 2008. This summary is a collection of comments made by interviewees, organized by theme. Each bullet point represents a single person's comment.

All points made and issues identified in this summary are those conveyed by the interviewees. To obtain useful information, interviewees were assured that responses would not be attributed to specific individuals or organizations.

STAKEHOLDER INTERVIEWS CONDUCTED

Trade Groups & Non-Profits

- Built Green, Aaron Adelstein (Director)
- Climate Solutions, Rhys Roth (Co-Founder and Director of Clean Energy Programs)
- Northwest Energy Efficiency Council, Stan Price (Director)
- Pollution Prevention Resource Center, Ken Grimm (Industry Outreach Manager)
- Sightline Institute, Clark Williams-Derry (Research Director)
- Solar Washington Association, Pamela Burton (President)
- Washington Clean Technology Alliance, Graham Evans (Executive Director)

Public-Private Partnerships, Groups, and Initiatives

- Enterprise Seattle, Steve Gerritson (Business Development Manager)
- Sustainable Snohomish, Carolyn Mayer (President)

Government

- Community, Trade and Economic Development (CTED), Energy Policy Division, Tim Stearns (Senior Energy Policy Specialist)
- King County Link Up, Kris Beatty (Program Manager)

Clean Tech Businesses

Energy

- Greenwood, Michael Kuenher (Vice President)
- Imperium Renewable, Todd Ellis (Director of Business Development)
- Prometheus Energy Company, John Barclay, (Chief Technology Officer)
- Propel Biofuels, Rob Elam (Chief Executive Officer)

Transportation

- Goose Network, Zachary Corker (Sales & Marketing Manager) and Charlie Crissman (Chief Executive Officer)

Resource Efficiency & Green Building

- Eco-Tec, Herb Pearse (President)
- Joseph McKinstry Construction Company, Ash Awad (Vice President)
- Mithun, Dave Walsh (Senior Associate)

Investors/Venture Capitalists

- Northwest Energy Angels, Lars Johansson (Board Member)

INTERVIEW RESPONSES

Definition of Clean Tech

- When we talk about clean tech, we use a very broad definition, covering everything from software development to energy usage.
- For energy providers to be “clean tech” these energy systems ultimately have to become sustainable, renewable, and cost-effective.
- Clean technology is an evolving definition. You know it when you see it. The firms we know that are clean tech are the ones we work with in the alternative fuels sector.
- As an overarching definition of clean tech, I would say firms that focus on products and services that are highly efficient and low impact.
- We define it a little more broadly than just looking at newer industries. We consider cleaner technology rather than just clean technology. Coming from a pollution prevention focus, there are certain things you can and cannot do to reduce their environmental footprint. An example: consider By-products Energy Northwest, a collection of companies in a membership-based organization. They look at waste products generated in their businesses and how that could be used as feedstock for other industries. Or Boise-Cascade, a paper mill, has been doing a lot of great things, but it still is essentially a paper mill.
- Clean tech encompasses all sustainability industries, including power generation and storage and green building.
- We’re so focused on traditional words like reuse and recycling from the solid waste field that we don’t focus on defining clean technology.
- Clean technology is green homebuilding and preserving the natural environment through using energy-saving materials and components.

Current Industry Issues and Challenges

- A key issue is that we enjoy low energy prices in the Northwest due to abundant hydroelectricity. This low price point makes it difficult to realize the full cost-efficiencies of green technologies. Part of the solution to this problem is to make the utility companies more homogenous in their execution of conservation programs. Another part of the solution is to increase the State incentives to make these projects more cost effective
- The costs associated with clean technology products and services is a challenge. It is hard to find funding sources and access to capital.
- Customer education in general is a challenge. When people think of clean tech they think of solar and wind. But it actually encompasses readily available, locally high-energy fuel, such as wood chips. We are clean tech because we take those high energy fuels and combust them very efficiently and very cleanly.

- New technologies must be economically viable in the short term (2-3years).
- Firms must have the capital and resources to execute the plan.
- The reality of establishing a (clean tech) business means realizing an integrated supply chain.
- There is a lot of ignorance and misinformation about what clean technology is.
- As with any new technology it is a matter of changing the mindset of those involved in maintaining a clean environment to look at the best technology for that task as opposed to continuing to implement more familiar but less effective technologies.
- Greenhouse gases and climate change: we all know it's a huge issue and there will be some monetizing or regulating of carbon. I think that is a good thing, but there is a lot of uncertainty right now.
- Transportation directly affects quality of life and climate change. It affects our competitive advantage with other cities because of our traffic. It's the Achilles heel of the region.
- A major challenge we face is overcoming the perception that alternative energy is always more expensive and the quality is always compromised.
- There are two key issues: 1) a shortage of skilled labor, from those with scientific training such as engineers to welders and tradesmen; and 2) access to capital.
- The other issue I'd mention are the regulatory hurdles that accompany the permitting and installation of new materials. There are long lead times for certain materials and high prices are also challenging.
- Creating the right partnerships is a huge challenge. This is a three way arrangement composed of energy suppliers, utilities, and customers.

Key Factors Affecting the Industry in the Next Three to Five Years

- A key factor facing the clean tech sector is the challenges presented by a maturing market. Young firms will face stiff competition from the large incumbent firms.
- Gas prices are an important piece of the puzzle.
- Increased government involvement in the field will be an ongoing challenge.
- Increasing environmental awareness will drive the industry. Over the past three years, we've seen a real tipping point. Again, education is important.
- Getting the needed talent is more and more difficult. These are interesting technologies that were developed in the 1970s, but we need people who can also bring them to the market.
- Getting people with the right skills: product engineering, combustion engineering, and manufacturing engineering.

- We've moved beyond the question of is this a fad or not. We are at a point that people realize that the buildings they live in and the products they buy really matter: sustainability really will be the issue that most affects our kids. The danger is people will just try to jump on the bandwagon. We have mainstream awareness now; the next step is to make sure it won't devolve into a fad.
- Without clear standards and definitions greenwashing becomes a challenge. That is to say that the standards could become too lax and fail to really test that products are "green" or sustainable.
- Over-development in the biofuels field will be an ongoing issue. We've really overbuilt the ethanol market and there is starting to be a backlash. Biofuels have really sucked up a lot of investment capital. Access to capital will continue to be an issue. A key constraint on the biodiesel industry is an inadequate feedstock supply.
- Labor will also be an ongoing issue. Many of the skilled tradesmen that are employed are on the verge of retirement and there really is nobody to take its place.
- New need trained people to join the workforce, including electricians, plumbers, architects and contractors who are knowledgeable in solar installation.
- Public policy is an important driver. How strong are the policies that shape the market? We need strong public policy to create markets for local clean technologies. This will lead to an export market for local technologies.
- A key factor is the Puget Sound Region's ability to build on its strengths. This includes green building and efficient lighting. Two related issues with this are effective marketing of the Puget Sound Region and utilization of design-based techniques as opposed to technology. Another factor is Seattle's excellent management of intermittent resources, which stems from the region's experience managing hydro. This knowledge is complementing and accelerating the expansion of wind power in the region.

Methods Used to Track Market Trends

- We face the same challenges others do with the lack of data. We track data organically, reading, tracking our clients and competition.
- Our industry is like the Wild West. Solar and wind have much larger players, but in the biomass market there are not large player. It's a very fragmented market. Europe is farther along and research firms are beginning to track what is happening.
- We actively participate in professional organizations and often cosponsor conferences that we think are important. We have people on national or regional boards like the International Interior Design Association and the Cascadia Green Building Council. You get a good sense of what is going on in your market is through that.

Clean Technology Supply and Demand Chains

Identification of Major Suppliers and their Locations

- Imperium Renewables is the largest supplier of biodiesel in the region and their Grays Harbor biodiesel facility is one of the largest in the world.
- Our suppliers are utility companies located in the U.S. and Canada, the U.S. military primarily in Washington State, oil Companies in the U.S., Canada, and Nigeria, and ports across the U.S.
- On the supply side, Waste Management is the obvious connection here as they are one of the large contractors for the City of Seattle Waste Management.

Identification of Major Customers and their Locations

- On demand side, King County is one of the larger players with their recent purchase of 280 Hybrid buses.
- On the demand side, the City of Seattle has really raised the bar with its well-executed and comprehensive recycling plan.
- We find that the majority of demand for green building comes from King County.
- The demand side has really been shaped by performance management contracting. This is a process where a contractor performs an energy audit to assess energy inefficiencies present in a building. The State then guarantees the financing of the rebuild. This process is applied at schools and State buildings. It has had a multiplier effect as firms that have successfully developed this market have carved out a successful niche for themselves and the market will continue to grow.
- Schools, cities, and private offices are our customers.
- Major customers are government entities including King County Metro and Snohomish County. Additional customers include progressive business fleets and individual users

Workforce Needs and Challenges

- A number of new jobs are developing around green building; some of these jobs did not exist before. It is important to note there is both job growth and skill development happening within an existing industry.
- Community and technical colleges are a great source of workers. Last week, I was at Walla Walla Community College, and it has a huge new water quality school. There should be an effort made to work with community and technical colleges because they are pretty responsive to industry needs.

- Community and technical college could really serve here. There is a real shortage of people to do maintenance on wind farms. I'm not sure who has courses designed to teach those skills, but that is hampering growth in wind power: there is a shortage of qualified technicians.
- There is a need for more LEED-certified electricians, architects, contractors, and engineers.
- We are facing a shortage of skilled workers. New need to rethink the workforce of the utility industry as we see an enormous wave of retirements across the utility industry. We are losing the people who know how to operate the grid, replace older workers with new workers who can work with a SMART Grid.
- We expect minimum baseline knowledge of sustainability. LEED-accredited professional is the baseline. If we hire someone who is not a LEED-accredited professional there is an expectation they will become one within 6 months.
- We need to look back to our higher education system. Are people teaching about sustainable and integrated design? You have to think about how what you do affects energy consumption, mechanical engineering, etc. You need to be trained in a different kind of mindset, one that is open to not working in a silo, and with greater flexibility and foresight.
- We need trained people to join the workforce such as electricians, plumbers, architects and contractors who are knowledgeable in solar installation.

Site Requirements

- For an expansion office, we would look for a small office with a reasonably sized parking lot.
- We require access to roof penetration. We don't want to be near anyone with an open air bar since we may emit smoke. Being adjacent to open green space is helpful.
- We'd look for Class B office space, plus lab space. Economical warehousing space would also be quite attractive. Freeway access is more about convenience for staff than production and distribution.
- In 3-5 years we might be double in size to about 20,000 square feet. We'll try to keep our site rather lean.
- For technological and prototype development, along with our front end business, the minimum square footage is 6,000 square feet. The most a clean tech firm like ours would need would be 20,000 square feet.
- We look for industrial park buildings, with capacity for front end support and R&D space in the back. Our company needs spaces that are zoned for gasses and flames.
- We initially want at least 2000 square feet of office and warehouse space.

Location Factors and Mountlake Terrace's Advantages and Disadvantages

- Walkability is important.
- Cheaper office and warehouse space is attractive. Most of these smaller companies need smaller spaces than major companies. They also need cheap spaces. You tend to find those types of buildings in smaller cities
- Taxes are going to be the same everywhere in Washington. Local taxes aren't going to be that much of an issue. Rental rates and personalized services are the main positive factors a city can offer.
- The relative convenience of commuting is a big factor as transportation and commuting issues are big problems regionally. You'll have fewer commuting problems in a city like Mountlake Terrace
- Mountlake Terrace has access to educated people and is close to both I-5 and 405. A shorter commute and alternative transportation options are strong pluses.
- Mountlake Terrace probably has access to a vibrant center and is close to the Seattle market for green products while enjoying lower costs. The biggest disadvantage is nobody has heard of Mountlake Terrace.
- The attractive concentration of good services coupled with good transportation is hard to find. Smaller communities that you have to drive to need to make their communities feature more attractive, dense urban development so that once you're there, you don't have to drive again to find support services or restaurants.
- Smaller cities have low-cost space, but the access to intellectual capital is extremely important for sustainable design firms.

Supportive Public Policies or Actions

- There should be a willingness from the top down to work with clean technology firms, from the Governor to mayors to city bureaucrats and local planning departments.
- It's important to create and foster a green image. Hold technology fairs and other such events to promote the region as a clean tech sector. Create information packets and websites to attract clean tech firms to the region. It's important to have knowledgeable people on the staff to accommodate any development interest.
- Cities or regions could designate a district as incubator or start up space.
- Commitments to green purchasing and standards are needed. The State standards for reducing carbon and purchasing energy should be enforced by public policy that sets measurable targets.

- Incentives seem to work, but it's often hard for companies to locate effective incentive programs.
- There are some fantastic tax incentives for the use of solar photovoltaic installations but no one is taking advantage of it. We're not sure why.
- Tax incentives are helpful but they must be transparent, accessible, and stable: they should be integrated into the permitting process.
- Thoughtful city policies can incentivize desirable behavior. The City of Seattle established green building practices for all its housing projects and the City of Issaquah had the Issaquah Heights project required to be Northwest Energy Star certified. These processes built up familiarity and trust among members of the banking, insurance, architecture and development communities. This has had a multiplier effect on green building.
- Cities should lead by example by purchasing and implementing the most effective technologies.
- Local governments have some powerful tools to incentivize sustainability. I would encourage leading with the carrot as opposed to the stick.
- I haven't permitted a project through Mountlake Terrace. But if you give priority review for sustainable projects, that is a powerful incentive for developers. Time is money, and if you can cut time by six months, that's a whole other ball game.

The Importance of Community Values

- Green image is not the first driver in where a firm locates, but it can be a powerful factor. Folks like to work around other like minded people.
- I think a community's image and values do matter. For example, there is a community of green architects and developers in Seattle because of Seattle's reputation of being a green community.
- A clean tech firm needs community livability, green image, especially when competing for talent. Employees want to align their personal values, the values of their employer, and the values of their community.
- Community values are very important. Employees of green firms often choose the sector because it meshes with their personal values.
- Its physical space is the embodiment of a firm's values, especially looking through the lens of sustainable design. It's about talking the talk and reflecting our sustainable values. Our building is naturally ventilated and we take advantage of natural lighting. Buildings need to be a reflection of a company's values.