

**DATE:** March 13, 2013  
**TO:** Board of Commissioners  
**FROM:** Patrick Quinton, Executive Director  
**SUBJECT:** Report Number 13-05  
Update on the Clean Technology Cluster Strategy

**BOARD ACTION REQUESTED**

No action is requested, information only.

**SUMMARY**

Since the adoption of the 2009 Economic Development Strategy, the Portland Development Commission (PDC) has worked to implement action items outlined in the strategy, including supporting the clean technology cluster as one of four key areas of opportunity to grow traded sector jobs in Portland. PDC's initial clean technology strategy took a sub-sector focus with the establishment of in-depth industry knowledge and partnerships within three key areas: renewables (with a particular focus on solar and wind), electric vehicles, and green development. That initial focus led to the following successful outcomes:

- Diversifying Portland's regional manufacturing expertise into the renewable energy supply chain;
- Assisting with the launch of Drive Oregon to represent firms involved with the development and production of both electric vehicles and energy storage technologies;
- Retaining and recruiting major renewable energy firm headquarters and expansions;
- Expanding demand for energy efficiency products and services through co-investment in Clean Energy Works Oregon; and
- Growing opportunities for Portland firms to innovate through demonstration projects like Portland State University's Electric Avenue and the Portland Sustainability Institute's EcoDistrict approach.

This updated clean technology cluster strategy is a natural evolution of PDC's work to date; a demonstration of PDC tools that can assist industry (such as supply chain and pilot project activity); and an acknowledgement of significant market shifts that have changed industry dynamics. Such shifts include the growth and subsequent contraction of incentives and private venture capital; the rise of corporate and non-institutional capital investors; and the significant rise of new global competition concurrent with new global opportunities for market expansion.

In response to these changes and through discussion with industry partners, PDC has developed an updated clean technology strategy. While there is relative consensus across industry regarding likely growth market opportunities (such as in energy efficiency), the goals and initiatives outlined in the updated strategy are cross-industry action items intended to guide PDC's near term investments, priorities, and partnerships in a continued effort to advance Portland's clean technology economy. A summary of the updated strategy's key initiatives is as follows:

- Living Laboratory  
Launch a City as First Adopter program to pilot demonstrating cutting edge industry approaches and solutions as part of regular public investments in capital infrastructure improvements and revitalization projects, and pursue strategic partnerships with other research and innovation mission-driven institutions (i.e., Portland State University). Pursue partnerships and projects that help accelerate consumer adoption, including in commercial energy retrofit, high efficiency new construction, and district scale energy, water, and waste management solutions. Develop a streamlined public procurement process for clean technology and green procurement tied to Portland regional public investments. Assist companies participating in the adopter program to receive certification(s) required to access broader market channels.
- Entrepreneurship Ecosystem  
Directly invest in or partner with key organizations (such as Oregon’s signature research centers, industry organizations and higher education institutions) to accelerate the transformation of research into commercialization and job growth. Support matchmaking between Portland firms and larger or multi-national firms to promote Portland’s approaches and technologies and capture strategic operational and investment opportunities driven by larger firm needs. Capitalize on Portland’s regional competitive advantages by encouraging partnerships with other key areas of economic strength, such as the software, advanced manufacturing, and the athletic and outdoor industries.
- National and Global Market Expansion  
Provide services to help Portland firms identify new markets and prospects, facilitate ongoing conversations, and help build relationships for firms to pursue export sales opportunities. Steward the We Build Green Cities brand campaign on behalf of industry members and partners, leveraging Portland’s leadership reputation to tell the story of Portland’s firms as solution providers and innovators, and to generate further visibility for the region’s clean tech ecosystem.

## **BACKGROUND AND CONTEXT**

Portland has been a leader in clean technology and green growth since the 1970s. The region has a demonstrated legacy of developing integrated solutions to urban energy, resource, and development challenges through strong private sector collaboration, public-private partnerships, and innovation.

The clean technology industry is a broad category of innovative products, processes, and services that share a common thread in applying innovation to produce efficiencies in resource consumption with competitive pricing and performance. Within this cluster, PDC’s focuses on traded sector economic and job growth opportunities. At a national and global scale, these opportunities are shifting with changing market dynamics like decreasing clean tech solution costs concurrent with increased market demand for those solutions; new policies targeting carbon neutrality and energy independence; intermittent global, national, and regional incentives; and growing global competition to dominate the clean technology market. At a local level, Portland has clear advantages and challenges within the global market.

Late last year, PDC worked with Clean Edge (a research and advisory firm), and a cross-industry advisory panel to review Portland’s industry trends and regional ranking, discuss potential sector priorities as well as cross-industry gaps and challenges, and develop suggestions for key action areas. The updated strategy’s goals and initiatives reflect that industry input. In addition, the strategy outlines key partners for implementation and identifies next steps related to measuring strategy progress.

## **ATTACHMENTS**

- A. *Draft Portland We Build Green Cities – Advancing Portland’s Clean Technology Economy*



**PORTLAND** **WE BUILD GREENCITIES**

Advancing Portland's Clean Technology Economy

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DRAFT

## INTRODUCTION

A race is on. Globally, cities are competing to gain the leadership position as the world moves toward resource conservation, energy independence, and climate preparation. Portland has earned that title. After more than 40 years of leading policy and commercial practice in urban development and investment, Portland has preserved its environment, improved equity, and made a more economically competitive and livable city.

### **WE BUILD GREEN CITIES.**

**It's in our DNA.**

**It's not just a lifestyle, it's an industry.**

**We work together to imagine the city of tomorrow and then build it.**

**We do this at home and around the world.**

Portland has blazed the trail for green growth since the 1970s. Among the elements contributing to Portland's success are a culture of strong partnerships, a spirit of craft and innovation, and an integrated approach to urban challenges.

- We live, work and play in buildings that embody our history and our DNA – we have the most LEED Platinum projects per capita in the U.S.
- We ride, drive, and walk our talk - we're home to the highest number of electric vehicle charging stations per capita in the U.S. and ranked #1 in the U.S for bike commuting.
- We are ranked as the #3 clean tech city, rivaled only by the Bay Area.<sup>1</sup>
- Our city has the 5th greenest workforce in the U.S.<sup>2</sup> and we are growing that workforce every day. In fact, we are #1 in new clean jobs.<sup>3</sup>

A few of our firsts...

- 1970.
  - o Oregon enacts the country's first refundable bottle deposit and comprehensive land use bill. Today, Portland has 1,000 jobs in the recycling industry with many more linked to new business and product opportunities associated with recycled materials.
- 1980.
  - o Portland's first MAX line uses freeway funds to pursue a region-wide mass transit system. While used in Europe, the only other modern light rail in the U.S. had just opened in San Diego. Today, Portland's total transit system links the airport, downtown, the Convention Center, and Portland's outer west and eastside suburbs.
  - o The Metro regional government is established and forms a regional urban growth boundary — one of the first of its kind — preventing sprawl and supporting compact and efficient urban growth. Today, Portland's green development firms are master-planning new compact urban neighborhoods globally, from China to Qatar.
- 1990.
  - o The City of Portland is the first in the nation to adopt a Global Warming Action Plan, a comprehensive climate strategy with an aggressive transportation agenda. The

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<sup>1</sup> U.S. Metro Clean Tech Index, Clean Edge, 2012, [www.cleandge.com/research/metro-index](http://www.cleandge.com/research/metro-index)

<sup>2</sup> Counting Up to Green, Economic Policy Institute, 2012, [www.epi.org/files/2012/bp349-assessing-the-green-economy.pdf](http://www.epi.org/files/2012/bp349-assessing-the-green-economy.pdf)

<sup>3</sup> Clean Jobs Index, Ecotech Institute, 2012, [www.ecotechinstitute.com/cleanjobsindex](http://www.ecotechinstitute.com/cleanjobsindex)

fundamental goal of the strategy was to reduce greenhouse gas emissions to 10 percent below 1990 levels. According to a 2012 update on the City of Portland and Multnomah County Climate Action Plan, the region has reduced carbon emissions 26 percent per person since 1990 and total carbon emissions have fallen to 6 percent below 1990 levels despite population growth.

- Portland is the first U.S. city to implement car-sharing. Today, Portlanders drive 20 percent less than comparable cities and have five different car sharing services – from pay by the hour services like Zipcar to Daimler’s pay-per-minute Car2Go. In 2012, Getaround and Relay Rides, both peer-to-peer car sharing services, planned entries into the Portland market.
  - Portland reintroduces the streetcar to the city’s transit system with a new alignment connecting Portland State University to Portland’s northwest neighborhoods; today United Streetcar LLC, a Portland-region firm, is pioneering the manufacturing of modern, efficient, safe and reliable American-produced streetcars.
- 2000.
- The City of Portland adopts a Green Building Policy requiring new construction and major renovations of all city facilities to meet LEED certification standards. The Portland Development Commission (PDC) follows suit a few years later, requiring similar green building metrics for all public-private partnerships of a certain scale. Today, Portland has the most platinum LEED-certified buildings per capita in the U.S., and our developers, architects, engineers, and other green building services firms are working nationally as two million new square feet of real estate becomes LEED-certified each day.
  - Portland is the first city in the U.S. to adopt a local Renewable Fuels Standard for all motor vehicle fuels sold inside city limits. The standard requires that all diesel fuel sold in the city contain a minimum of five percent biodiesel and all gasoline contain a minimum of 10 percent ethanol. Sequential Biofuels, headquartered in Portland, has grown significantly to meet the increasing demand for sustainable fuel.
  - In 2007, Oregon passed one of the most ambitious renewable energy laws in the nation, the Renewable Portfolio Standard requiring large utilities to provide at least 25 percent of their electricity from renewable energy sources by 2025. Qualifying renewable energy sources include wind, solar, ocean, tidal, geothermal, hydrogen, and some types of biomass and hydroelectric facilities. Today, the wind energy industry makes Portland its U.S. epicenter, with Vestas and Iberdrola both locating their North American headquarters in downtown Portland.
  - Portland launches Clean Energy Works, a program offered to homeowners designed to reduce energy waste with no money down and easy financing. In 2011, the program expanded statewide after a successful pilot that garnered \$20 million in federal stimulus funds.
  - Building on previous climate reduction strategies, Portland and Multnomah County adopt a Climate Action Plan to reduce greenhouse gas emissions by 80 percent by 2050. In 2009, the City adopts its first Economic Development Strategy in 15 years with a focus on clean tech as a traded sector industry critical to the health of the larger Portland economy.
- 2010.
- Portland has more than 315 miles (510 km) of developed bikeways, accommodating the nation’s highest percentage of bike commuters at a 7 percent mode split. Portland’s own Alta Planning has instituted bike sharing programs in Boston,

Washington, DC, and Melbourne, Australia and is in the process of launching systems in nationally and in Vancouver BC.

- The Portland Sustainability Institute launches its EcoDistricts initiative. Recognizing that sustainability strategies at a neighborhood scale are known but challenging, the Institute launches a framework and implementation tools to enable green neighborhood-scale development globally.
- The Portland Trail Blazers become the first major sports team to earn LEED Gold status for a major league sports facility, a milestone in the greening of sports. The Green Sports Alliance establishes its headquarters in Portland, bringing together venue operators, sports team executives and environmental scientists to share better practices and develop cost-competitive innovative solutions to environmental challenges.

Since Portland’s adoption of the 2009 Economic Development Strategy, the Portland Development Commission (PDC) has worked to implement action items outlined in the strategy, including supporting the clean technology cluster as one of four key areas of opportunity to grow traded sector jobs. PDC’s initial strategy took a sub-sector focus with the establishment of in-depth industry knowledge and partnerships within three key areas: renewables, electric vehicles, and green development. That initial focus has been successful and resulted in outcomes like retaining and recruiting major renewable energy firm headquarters; helping launch Drive Oregon; expanding demand for energy efficiency products and services; growing new opportunities for Portland firms to innovate with demonstration projects, such as Portland State University’s Electric Avenue and Lucid Energy’s turbine installation; and diversifying our regional manufacturing expertise into the clean energy supply chain.

This updated strategy is a natural evolution of PDC’s work to date; a reflection of the tools PDC has demonstrated can assist industry; and an acknowledgement of significant market shifts that are changing industry dynamics. In response to these changes, and through discussion with industry partners, PDC has developed an updated clean technology strategy that incorporates an ongoing focus in acknowledged growth opportunity areas, like energy efficiency, while providing for across industry action strategies to guide PDC’s near term investments, priorities, and partnerships.

### **Multnomah County Job Change: Clean Tech, 2008-2012**



Source: Economic Modeling Specialists, Inc.

Examples of Clean Tech Firms in the Portland region	
<b>Renewable Energy</b>	
<b>Solar</b>	SIC Processing
<b>Wind</b>	Vestas
<b>Hydropower</b>	Columbia Power Technologies
<b>Waste to Energy</b>	Agilyx Corporation
<b>Low Carbon Technologies</b>	
<b>Energy Efficiency</b>	McKinstry
<b>Electric Vehicle</b>	Green Lite Motors
<b>Smart Grid, Energy Storage</b>	ClearEdge Power, Inc.
<b>Green Building</b>	
<b>Architecture</b>	ZGF Architects
<b>Engineering</b>	KPFF Consulting
<b>Builders</b>	Skanska
<b>Environmental Goods and Services</b>	
<b>Water &amp; Wastewater</b>	CH2MHill
<b>Environmental Consulting</b>	David Evans and Associates

## CLEANTECH SNAPSHOT

### Industry Definition

When compared to Portland's other target industries, clean tech is unique in that it is a broad category of innovative products, processes and services that share a common thread in applying technology or operational innovations to produce efficiency (reducing resource consumption and inputs, waste or pollution) while competing favorably on price or performance.

Cluster industry segments and sub-segments include the following types of products and services, with PDC's activity focused on those sub-segments with traded sector opportunities:

- **Renewable Energy**
  - ✓ Solar
  - ✓ Biomass
  - ✓ Geothermal
  - ✓ Wind
  - ✓ Hydro/Marine/Tidal
  - ✓ Waste to Energy
  - ✓ Renewable Consulting
- **Low Carbon Technologies**
  - ✓ Alternative fuels
  - ✓ Electric and Hybrid Vehicles
  - ✓ Advanced Materials (+)
  - ✓ New and Emerging Technologies
  - ✓ Energy Efficiency Consulting and Contracting
  - ✓ Energy Efficiency Products and Materials
  - ✓ Advanced Batteries & Fuel Cells
- **Green Building**
  - ✓ Green Architecture and Design
  - ✓ Green Builders
  - ✓ Green Building Materials
- **Environmental Goods and Services**
  - ✓ Waste Management
  - ✓ Recycling and Reuse
  - ✓ Contaminated Land Remediation
  - ✓ Environmental and Sustainability Consulting
  - ✓ Environmental Monitoring and Instrumentation
  - ✓ Water Supply and Waste Water Treatment

### Industry Trends

With influences like the growth and subsequent contraction of clean tech venture capital; the rise of corporate and non-institutional capital investors; and the rise of clean tech superpowers like China, the clean tech sector has experienced significant shifts and global competition over the past five years. Similar to other industries, clean tech growth slowed since 2008, but various indicators of the industry's health demonstrate growth since the 2007 levels, showing that clean tech is a long term growth market:



	2007	2011	2012	5 Year Trend
Clean Tech Venture Investments (U.S.) <sup>4</sup>	\$4.0 billion	\$6.7 billion	\$5.0 billion	+25%
Clean Tech Venture Investments (U.S. % of Total Investments) <sup>4</sup>	12.7%	23.3%	19.0%	+7%
Industrial/Energy Venture Backed Mergers & Acquisitions (M&A) <sup>5</sup>	5	-	19	+280%
Industrial/Energy M&A Value <sup>5</sup>	\$853 million	-	\$1.2billion+	+41%

### Future clean tech industry trends to watch

- **Growth in Renewables Installation.** New wind power installation capital costs are projected to expand by almost 65 percent by 2021 – to \$116.3 billion. In 2011, global wind power installations equaled 41.6 gigawatts, the largest year on record, with China the global leader in new installations. The European Union and the U.S. were the next largest growth markets, respectively.

Similarly, the solar market is expected to grow by almost 85 percent to \$130.5 billion of investment by 2021. Installation investment is growing quickly, with installations climbing from 15.6 GW in 2010 to more than 26 GW worldwide last year, a 69 percent growth rate. In just a couple of years, the U.S. has grown from five percent of the global market to more than 10 percent of all new PV installations.

- **Emergence of Smarter, More Efficient Buildings.** Major cities across the U.S. are seeking or regulating for greater transparency in commercial building energy consumption. This is mirrored in market trends toward a better understanding of building performance; more than 28 billion square feet or about 40 percent of the country’s commercial building inventory use ENERGY STAR’s Portfolio Manager to monitor and report energy performance.

Savings due to energy efficiency offer the cheapest source of power. According to the Edison Foundation’s Institute for Electric Efficiency, energy efficiency savings in the U.S. average a cost of just 3.5 cents per kWh. Products like LED lighting, which has fallen to \$10 for a 60-watt-equivalent bulb, are enjoying mass-market deployment.

The commercial and residential sectors are also increasingly investing in automated systems and technologies that allow owners and facility managers to translate data to remotely monitor assets. With reduced system costs, technologies like smart meters and energy management systems see payback through energy savings and other operational efficiencies. The advent of cloud computing could further drive the ease and importance of data in building development and management, while also potentially reducing everyday IT loads.

<sup>4</sup> 2013 Clean Energy Trends, Clean Edge, Inc.

<sup>5</sup> The Reports of Cleantech's Death Are Greatly Exaggerated, Pangaea Ventures Ltd., 2013, [www.pangaeaventures.com/blog/the-reports-of-cleantechs-death-are-greatly-exaggerated](http://www.pangaeaventures.com/blog/the-reports-of-cleantechs-death-are-greatly-exaggerated)

Similarly, a growing awareness of limited fresh water availability is leading to new technologies - conservation-oriented fixtures, rainwater recovery systems, black water treatment systems and other new innovations - to reduce water consumption at a building and infrastructure scale.

- Net-Zero and Carbon Neutrality. As LEED and ENERGY STAR ratings become more commonplace, firms and cities will increasingly look to the next generation of net-zero design and development for a competitive advantage; however, net zero standards are being more often experienced on the global market. Leading technology companies like Microsoft and Google have announced carbon footprint reduction goals and strategies, further driving this market shift. At an infrastructure scale, technologies and applications related to intelligent transportation systems are further contributing to carbon neutrality.
- Waste-to-Resource. In multiple sectors, from energy to water, there remain untapped technological opportunities to generate new efficiencies. U.S. municipalities generate a waste stream of 435 million metric tons each year – offering a vast opportunity to turn waste into a desired resource, from low-carbon fuels to electricity to recycled products to specialty chemicals.

#### **Future clean tech challenges**

- Market Competition. Low-cost natural gas in the U.S. poses both a unique challenge and opportunity, offering new pockets of economic activity and influencing demand for renewables and efficiency. Falling PV costs allow for greater market adoption but create a challenge for domestic solar manufacturers to compete on the global market. The market will likely see ongoing consolidation and M&A activity as lower prices put increasing pressure on companies.

Similarly, while plug-in hybrid electric vehicle (PHEV) or electrical vehicle (EV) models are available from all major manufacturers, research and development into new technology is being developed for conventional and diesel engines to reduce emissions, increase efficiencies and require fewer parts that could rival the PHEV and EV technology's market growth. While EV infrastructure, including charging stations, is firmly established in select markets, the hubs are primarily in those areas with a strong early adopter culture and/or supportive government policies.

- Technical Challenges at the Grid Scale. The capacity for grid-level, large-scale storage for renewable energy generation may be harder and more expensive than previously thought. Without considering the renewable/grid interface, clean energy technologies will be limited in the power demand they can meet. The nation's existing electrical grid will continue to be strained by increasing demand; an outdated infrastructure network together with major outages and disruptions from natural disasters will require new investments in storage and grid technologies.

The Bonneville Power Administration (BPA) is the Pacific Northwest's primary transmission owner and operator. Over the last five years, BPA has seen a rapid growth in wind power causing increased operational challenges to integrate renewable energy and provide balancing services in our area.

- Capital Availability. Although the focus to date has been on the scale and availability of venture capital, future clean tech investment will likely be about more than VC. The industry is experiencing a more diversified investment pool as the sector matures, including increased interest in corporate investment from some of the world's biggest companies, including significant global firms like Dow, Johnson Controls, Schneider Electric, Eaton, Honeywell, Hitachi, and General Electric.

Clean tech services and applications are increasingly demanding new financial models for the energy, infrastructure and real estate markets. Financial instruments, such as “green banks” or alternative bonding mechanisms can provide capital not currently on the market. In building retrofits, these tools are often tied to robust measurement and verification (M&V) technologies to ensure performance against projected savings.

Peer City Initiatives

The Portland metro area continues to rank as a leader in clean technology, from market adoption to industry growth; however, as the clean tech market grows so too does our competition. Cities nationwide from Denver to Seattle, San Francisco to New York are launching robust policy frameworks to advance their own green growth. The table below provides a brief overview of some of these leading initiatives in peer cities:

	<b>Cluster Focus</b>	<b>Innovation</b>	<b>Living Laboratory</b>
<b>Seattle, WA</b>	<ul style="list-style-type: none"> <li>• Puget Sound Regional Council focuses on clean tech as one of ten industry clusters</li> <li>• Hosts industry roundtables with a focus on education &amp; workforce development, business climate, entrepreneurship and innovation</li> </ul>	<ul style="list-style-type: none"> <li>• Partnership with University of Washington - Environmental Innovation Challenge and Center for Commercialization’s New Ventures Facility</li> </ul>	<ul style="list-style-type: none"> <li>• Building Energy Efficiency Testing and Integration Center to allow innovators to test products, applications, designs and services related to energy efficiency</li> <li>• Leveraging Puget Sound concentration of military assets as potential test beds</li> </ul>
<b>Sacramento, CA</b>	<ul style="list-style-type: none"> <li>• The Green Capital Alliance focuses on clean tech as one of seven clusters; supports research, workforce and business development, entrepreneur and startup support, regional sustainability, advocacy and tracking with the “Next Economy” as playbook</li> </ul>	<ul style="list-style-type: none"> <li>• Collaboration with utilities, state agencies, and universities with a focus on renewables and energy-related technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Convenes the Capital Area Plug-in Electric Vehicle (PEV) Coordinating Council, bringing together stakeholders to support increased adoption and usage of PEVs and associated technologies</li> </ul>
<b>San Jose, CA</b>	<ul style="list-style-type: none"> <li>• As part of a larger "Green Vision," the city's Clean Tech Strategy has set a goal of creating 25,000 clean tech jobs by 2022</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental Business Cluster (EBC) is a joint city/university clean tech incubator that provides commercialization support and facilities for emerging companies</li> <li>• Incubated 150 companies so far</li> </ul>	<ul style="list-style-type: none"> <li>• Launching the Environmental Innovation Center, a 22,500 sq. ft. demonstration center in partnership with Lawrence Berkeley National Labs</li> </ul>
<b>Colorado</b>	<ul style="list-style-type: none"> <li>• The Colorado Clean Energy Cluster is a statewide organization fostering market transformation for clean energy by focusing on innovative and entrepreneurial ways to grow the clean energy sector. Initiatives include clean energy supply chain and international clean tech cluster network</li> </ul>	<ul style="list-style-type: none"> <li>• The cluster is coordinating with federal and university partners on the FortZED initiative in Fort Collins - a net Zero Energy District pilot testing conservation, efficiency, renewable sources and smart technologies</li> </ul>	

Larger cities like San Francisco and New York City are also proactively pursuing clean tech growth through investment in cutting edge initiatives like San Francisco’s Living Innovation Zones or New York’s Green NYC 2025, which includes launching a Clean Tech Entrepreneur Center for business incubation and product demonstration and exhibition.

### Portland Market

According to Clean Edge’s 2012 Metro Clean Tech Index, a ranking of U.S. urban areas in clean tech performance, the Portland metro area is the #3 clean tech market nationally. Portland was ranked against other cities nationally for performance in four indicator categories: green buildings; advanced transportation; clean electricity and carbon management; and clean tech investment, innovation, and workforce. Oregon ranks #2 in their Clean Energy Leadership Index analyzing clean-energy economies of all 50 states.

*As part of industry outreach, a cross section of clean tech firms identify green building and energy efficiency as sub-segments with high job potential and a high regional fit.*

*Several other industry sub-segments that also ranked high for new market potential are products and services related to waste to energy, water, smart grid, and renewables.*

### **Regional Strengths**

- **Policy Leadership.** Portland and Oregon have demonstrated leadership in progressive clean tech policy. Governor Kitzhaber’s recently released 10 Year Energy Plan provides the next strategic step for meeting the state’s energy efficiency, renewable energy, greenhouse gas reduction, and transportation objectives, while creating investment opportunities to keep more capital in Oregon. With organizations like Energy Trust of Oregon, the City of Portland as well as the State of Oregon at large are well positioned to leverage existing state and local incentives to bolster the energy efficiency and clean energy trades. As part of the 10 Year Energy Plan, the State will establish a new State Building Innovation Lab to baseline energy use in every occupied state-owned building, perform retrofits, and conduct audits to develop knowledge for future commercial sector applications.
- **Early Adopter.** The Portland region has demonstrated its strength as early adopter, where consumer demand pushes the penetration of green into the market. This helps drive Portland’s leadership in areas like LEED-certified projects and electric vehicle infrastructure installation. Both PGE and Pacific Power were early entrants into the renewable and energy efficiency markets, creating regional leadership in talent, program development and technology deployment. Similarly, Portland residents and businesses voluntarily purchase nearly 709 million kilowatt-hours (kWh) of green power annually, enough to meet nine percent of the community’s electricity use and put Portland on the map as a leading green power purchaser.
- **Talent.** The region has built a critical mass of knowledge, expertise and personnel in both private sector industry and public universities. This builds on a long history of innovation in the technology sectors. We host one of the most significant concentrations of firms in renewable energy, environmental services, recycling and green building sectors. This is partly due to employers’ ability to recruit and retain employees because of the high quality of life. According to reports by both Pew and Brookings, Oregon ranks at or near the top in the percentage of jobs dedicated to the clean economy. Pew ranks the state at number one, and Brookings ranks Oregon number two, for the percentage of jobs in the clean-energy sector.
- **Location.** Portland benefits from its location. West Coast metro regions such as Seattle, San Francisco, and Portland are at the forefront of clean tech efforts and have a long history of supporting environmental protection and a clean energy economy. They enjoy the synergy of supportive policies, government leadership and information sharing. Portland also benefits from its proximity to the California market, one hungry for clean renewable energy.

## Regional Challenges

- Investment. With its capital-intensive nature and dependence on government policy, clean tech presents many challenges to venture capital investors. Globally, venture capital and private equity investment in clean energy companies dropped in 2012. The decrease came mostly as governments around the world backed off incentives for energy solutions. The biggest hits came in Europe, where the ongoing debt crisis struck. Portland has numerous U.S. headquarters and branch offices of European renewable energy firms. The inbound foreign direct investment derived from these firms' presence in Portland is important to our economy. Foreign companies with headquarters operations in Portland invest dollars through building renewable projects – benefitting subcontractor firms, paying taxes, and employing workers at often higher-than-average wage levels.
- Intermittent Incentives. Federal and state incentives have not provided long-term consistency. The wind industry seeks long-term tax policies, lasting more than just a few years, to provide market certainty. Incentives enable companies to make longer term capital and labor investments. Incentives also speed deployment by improving product and project economics, allowing developers and investors to raise additional capital and engage a greater volume of product and services. Business-directed incentives play a major role in a region's success in attracting companies. But because they necessitate government spending, incentives face severe headwinds in today's economic and political climate. Even so, incentives are crucial to industry development, and have played an important role in establishing clean-energy leadership in states like California, Oregon, and Massachusetts.
- Research and Commercialization. Portland and Oregon's research universities and facilities – like Portland State University's Green Building Research Laboratory and Oregon State University's Process Innovation Center for Sustainable Solar Cell Manufacturing – are growing in the clean tech sphere, but today, do not generate the intellectual capital or patents reflecting new innovations on par with universities located in other key clean tech markets.
- Energy Costs. Testing of energy efficiency business models in Oregon is often difficult due to the relatively inexpensive energy costs and mild climate the state enjoys. However, that same cheap electricity is an advantage that helped drive early investment by solar and high tech manufacturing in the state. Today, electricity costs in Oregon are expected to increase due to new demand from a significant number of data centers. With the popularity of cloud computing and the Internet, this trend is expected to continue to put pressure on energy costs.

## GOALS

This document is an extension of the overarching goals and actions outlined in PDC’s 2009 Economic Development Strategy—which seeks to build a sustainable economy through competitiveness and urban innovation, while spurring business vitality in the neighborhoods. It is also a reflection of the discussions held with public and private industry partners across the clean technology cluster.<sup>6</sup> The goals and strategies described herein will help guide PDC’s near term investments, priorities, and partnerships in an effort to advance Portland’s clean tech economy.

**Create Jobs.** We will create jobs by through proactive business development and recruitment and ensure the region remains a fertile ground for entrepreneurship. We will work with firms to connect them to financial and other resources to scale their business. We will continue to identify local and global business opportunities to foster new market opportunities.

**Attract Investment.** We will market Portland’s competitive advantages in clean technology and our supportive business environment to attract outside investment, create new employment opportunities, and drive project deployment of our firms’ products and services.

**Drive Innovation.** We will drive innovation by leveraging Portland’s culture as an early adopter and conducting pilot projects to test new approaches and technologies. We will draw from the successes in the green building and recycling industries to continue to the push cutting edge. We will facilitate mentorship opportunities between anchor firms and startups and develop connections with the other significant regional clusters including software and athletic & outdoor (A&O).

**Improve Resource Efficiency.** We will conserve natural resources by supporting the region’s use of the latest technologies and services. We will align our strategies and programs with significant policy actions including the Climate Action Plan and Governor Kitzhaber’s 10-year Energy Action Plan.

**Promote Leadership.** We will promote the region’s leadership position as a geographically-significant clean tech cluster. We will continue to convene public and private partners in the industry to discuss and tackle the opportunities and challenges within the cluster. We will host delegations to promote our region’s clean

*With the 2009 City of Portland Economic Development Strategy, PDC’s clean tech strategy focused on growing jobs in the electric vehicles, solar manufacturing, green development and wind energy sectors.*

### **WORKING TOGETHER, WE HAVE...**

- *Facilitated cluster organizing, including the launch of Drive Oregon*
- *Heightened and deepened retention and expansion efforts, connecting firms to resources including technical assistance, PDC finance, venture capital and workforce*
- *Retained existing businesses and recruited expansions through direct and indirect support of individual firms, working with companies like Vestas and Iberdrola.*
- *Expanded demand for energy efficiency products and services through co-investment in Clean Energy Works Oregon*
- *Increased opportunities for Portland firms to innovate and be involved with demonstration projects, such as Portland State University’s Electric Avenue and the Portland Sustainability Institute’s EcoDistrict approach*
- *Diversified regional manufacturing expertise into clean tech supply chain using partnerships and resources leveraged through the Jobs & Innovation Accelerator Challenge federal grant*

<sup>6</sup> In 2012, PDC, working with Clean Edge, convened industry partners via focus group sessions, industry surveys and individual meetings to develop recommendations to be included in an updated industry strategy.

tech companies. We will celebrate the local successes that our companies achieve which continue to position Portland at the forefront of the clean tech industry.

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## CLEAN TECH STRATEGY 2.0

Inherent in the implementation of the City of Portland Economic Development Strategy, PDC prioritizes investment to help create family-wage jobs and grow traded sector industries. The clean technology cluster is one of four target sectors prioritized for traded sector job growth. PDC's traded sector activities are built on the foundation of strong and intentional business development. PDC economic development staff proactively meets one-on-one with traded sector companies to address individual company needs, tackle issues inhibiting growth and identify the best resources to support business competitiveness. Technical assistance – i.e. market research, regulatory guidance, financial assistance, business planning, real estate advice, marketing, export promotion and workforce development – may be provided directly by PDC and/or through a local partner with specific expertise. This strategy complements the agency's business development work and outlines specific industry programs and initiatives designed to leverage characteristics and opportunities unique to Portland and increase the long-term competitiveness of the local clean tech cluster.

### Living Laboratory

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- Launch City as First Adopter Program
  - In lieu of a centralized center for clean tech innovation and enterprise, PDC and the City can use its purchasing power to launch clean tech innovations. As part of regular investments in capital infrastructure improvements and revitalization projects, clean tech firms will be invited to compete to test new technologies. PDC will work with City partners to update policies related to green development and can further provide concierge services to firms seeking to test projects. PDC will also pursue strategic partnerships with other research and innovation mission-driven institutions, like Portland State University and others, to augment such a program's resources and opportunities.
  - To help maintain the clean tech industry's competitiveness in the national and global markets, PDC will facilitate pilots demonstrating cutting edge industry approaches and solutions – projects like the Portland Water Bureau's installation of Lucid Energy's water turbine generating technologies in East Portland.
  - With the goal of commercializing pilot tests, PDC will assist companies participating in the adopter program to receive certification(s) required to access broader market channels. For example, PDC will work with Energy Trust of Oregon (ETO) to identify opportunities for a joint service provider strategy and to grow certification prospects for homegrown products within the energy retrofit market.
- Accelerate Consumer Adoption
  - PDC will partner with the City, County, ETO and private market players to launch a commercial energy retrofit program to bolster Portland's energy efficiency industry and leadership reputation. The program will capture "off the shelf" technical and financial solutions with joint public and private involvement to ensure replicability. The program will address large scale, high-density program recommendations – including opportunities for deep retrofit approaches – as well as neighborhood scale retrofits to support neighborhood Main Street business support.
  - Working together with the five pilot EcoDistricts launched in 2009, PDC will continue to pursue public-private partnerships to implement district scale energy, water, and waste management solutions. Key areas of opportunity identified to date include:



- ✓ Lloyd EcoDistrict: Rose Quarter redevelopment, Oregon Convention Center improvements, and the 700 Superblock as centers for EcoDistrict improvements.
- ✓ South Waterfront: North District build-out with an integrated energy and water management strategy.
- ✓ South of Market (SoMa) EcoDistrict: Portland State University's energy retrofit at a district and building scale tied to programmatic workforce training and R&D.
- ✓ Gateway EcoDistrict and Foster Green: stakeholder-led program development for neighborhood commercial retrofits and transit-linked improvements.
- Create a public procurement partnership with partners like the Oregon University System institutions, Portland Community College, Multnomah County, Metro, TriMet, and Portland Public Schools to create an institutionalized and streamlined process for clean tech and green procurement tied to public investment in properties, buildings, infrastructure, and other assets.

### Entrepreneurship Ecosystem

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- Advance Research to Commercialization
  - PDC will make direct investment or partner with key stakeholder organizations such as Oregon's signature research centers, industry organizations and higher education institutions to accelerate the transformation of research into commercialization and job growth. Support initiatives will include:
    - Investing in commercialization through grants to Oregon Built Environment & Sustainable Technologies (BEST) and university-driven clean tech research.
    - Supporting Oregon BEST to identify and connect industry and faculty to collaborate on applied research, development, and commercialization of sustainable technologies, such as through the Sustainable Built Environment Research Consortium.
    - Sponsoring and strengthening relationships with the Oregon Nanoscience and Microtechnologies Institute (ONAMI), Drive Oregon, Oregon Wave Energy Trust (OWET), and Northwest Collaboratory for Sustainable Manufacturing to match companies with commercialization programs and research resources.
- Matchmaking: Big <-> Small Companies
  - In an effort to attract investment, research or trade targeted mentorship for Portland's smaller companies, there is value in identifying and approaching larger local and multi-national firms to promote Portland's innovative firms and their technologies. Large firms often don't have complete, well-rounded solutions and are looking for technology partners, suppliers or strategic investment opportunities to complement their solutions or technologies. Providing in-bound or out-bound opportunities for local firms to demonstrate their products and services could improve the chance for local firms to partner with larger firms to scale up or enter new markets. These efforts will be coordinated with Business Oregon and the State's recently created Oregon Growth Board to help increase Oregon businesses' access to capital and state loan and technical assistance programs.

- Engage with larger and multi-national corporations to also understand their future operational demands for new solutions providing potential new clean tech market opportunities.
- Cross-Industry Fertilization and Cooperation
  - PDC will capitalize on our regional competitive advantages by encouraging partnerships with other target clusters – software, advanced manufacturing and athletic & outdoor – bringing new innovation to well established industries and technologies within the Portland market.
    - Collaborate with software cluster as well as Oregon BEST to create and co-host clean web and 3D printing hackathons to unleash clean tech solutions from app developers, coders, 3D printing enthusiasts and other technologists. Provide winners with grants to pursue commercialization of the products/solutions.
    - Work with A&O cluster to identify shared current and future needs for sustainable materials; establish and promote a materials inventory for green building and manufacturing industries. Hold industry workshops and forums to begin assessing/identifying high impact opportunities to replace existing toxic materials in the supply chain (i.e. automotive, furniture, toys, etc.). In addition, explore industrial efficiency opportunities associated with manufacturing processes.

Position and market Portland to capture additional clean tech manufacturing operations. U.S. companies are moving capital intensive manufacturing back to the U.S., such as solar, wind and electric vehicle manufacturing. Capital intensive firms require a skilled labor force to drive new innovation, and a location closer to home will allow them more intellectual property protection. The on-shoring decision is driven by various factors, including the decline in the value of the dollar; intellectual property control and quality issues; travel time and costs; and the increase of wages overseas.

### National and Global Market Expansion

- Grow Exports
  - Based on individual firm needs, PDC will provide an array of services to help firms identify new markets and prospects; facilitate ongoing conversations; and help build local relationships for the firms to pursue export sales opportunities. This will also include PDC partnering with state and regional partners to coordinate and host out-bound missions to select strategic markets with opportunities for new sales opportunities and relationship building.
  - Similarly, PDC will support state and regional partners as well as local partners like First Stop to receive in-bound delegations as an opportunity to showcase the expertise of Portland's clean tech firms and to facilitate new transactional opportunities.
- Brand Portland

PDC will steward the We Build Green Cities brand campaign on behalf of industry members and partners. The campaign will leverage Portland's leadership reputation to tell the story of Portland's firms as solution providers and innovators, and to generate further visibility for the region's clean tech ecosystem. The campaign can market Portland's competitive advantages to capture recruitment and investment opportunities.

The campaign will include development and promotion of key communications tools that focus on Portland's unique ability to offer integrated solutions across firm and industry lines. The overall regional marketing approach will be international in scope with foreign language access and placement, featuring companies with a global reach.

- PDC will partner with city bureaus like the Bureau of Planning and Sustainability (BPS), to network with other leading cities globally via thought leadership networks like the Clinton Climate Initiative and C40 as part of promoting Portland's leadership and to identify new markets and opportunities for clean tech firm engagement.

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## MEASURING SUCCESS

This strategy will provide a road map for PDC investment of time and staffing resources in a flexible manner adjustable to new opportunities and ongoing market shifts.

Success, however, requires putting the plan into action and measuring performance, which can only be accomplished with extensive coordination among partners across public agencies, universities, nonprofits, and industry. The table below cross references the strategy’s recommended initiatives against stated goals, and lists the priority partners PDC will need to work with in moving the strategy forward.

Similarly, PDC will partner to identify priority metrics – those relevant to the goal and strategy, capable of being readily tracked by PDC and its partners and demonstrating tangible success – telling the quantitative and qualitative story of Portland’s ongoing leadership and advancement in clean technology and green growth.

	Goals					Partners
	Create Jobs	Attract Investment	Drive Innovation	Improve Efficiency	Promote Leadership	
<b>Living Laboratory</b>						
Launch a City as 1 <sup>st</sup> Adopter Program			X	X	X	City of Portland (Office of Management & Finance, infrastructure bureaus, BPS); public partners and universities
Accelerate Consumer Adoption	X	X		X	X	City bureaus; Metro; TriMet; university partners; BOMA; Prop / Bldg Owners; utilities; NEEA; ETO
<b>Entrepreneurship Ecosystem</b>						
Advance Research to Commercialization	X	X	X	X	X	Oregon BEST and other signature research centers; PSU; Drive Oregon
Matchmaking Big <-> Small Companies	X	X	X			Key large scale technology partners; capital investors
Cross-Industry Fertilization / Cooperation		X	X	X		Technology Association of Oregon; Design Forum PDX; apparel and design community; OMEN; Manufacturing 21
<b>National and Global Market Expansion</b>						
Grow Exports	X	X			X	Greater Portland, Inc.; Business Oregon; Port of Portland; Metro
Brand Portland		X			X	USGBC-Cascadia Green Building Council; clean technology trade associations (e.g. AIA, OSEIA); First Stop Portland

## ACKNOWLEDGEMENTS

***PDC worked with Clean Edge, Inc. to identify Portland’s current competitive positioning in the clean tech industry. Recommendations were based on leveraging data from Clean Energy Index reports and direct feedback from key stakeholders thru industry surveys, focus groups, and one-on-one conversations.***

Clean Edge, Inc., founded in 2000, is the world’s first research and advisory firm devoted to the clean tech sector. For more than a decade the firm has delivered timely data, expert analysis and comprehensive insights to governments, corporations, investors, foundations, and nonprofits. The company offers an unparalleled suite of index, benchmarking, and advisory services including the State Clean Energy and U.S. Metro Clean Tech Indexes, sponsored publications including the annual Clean Energy Trends report, and benchmark clean tech stock indexes with NASDAQ®. To keep abreast of the latest clean tech trends or learn more about Clean Edge services, [visit www.cleantech.com](http://www.cleantech.com).

<b>Industry and Industry Partners</b>	
<i>BlueTree Strategies</i>	<i>Northwest Environmental Business Council</i>
<i>Business Oregon</i>	<i>Oregon Iron Works</i>
<i>CGT</i>	<i>Oregon Solar Energy Industry Association</i>
<i>CH2M Hill</i>	<i>Oregon Iron Works</i>
<i>Drive Oregon</i>	<i>Pacific Crest Securities</i>
<i>EDP Renewables</i>	<i>Pacific Energy Ventures</i>
<i>Element Power</i>	<i>Pacific Power</i>
<i>Energy Trust</i>	<i>PECI</i>
<i>GerdingEdlen Development</i>	<i>Pivotal Investments</i>
<i>Greater Portland Inc.</i>	<i>Pivotal Leaders</i>
<i>Green Lite Motors</i>	<i>Portland General Electric</i>
<i>Iberdrola Renewables</i>	<i>Puralytics</i>
<i>Indow Windows</i>	<i>Renewable NW</i>
<i>InSpec</i>	<i>SeQuential Pacific Biodiesel</i>
<i>Intel</i>	<i>Skanska</i>
<i>Lane Powell</i>	<i>Stevens Water Monitoring Systems, Inc.</i>
<i>Lucid Energy</i>	<i>Tanner Creek Energy</i>
<i>McKinstry</i>	<i>Treeline Capital</i>
<i>Nike, Inc.</i>	<i>ZGF Architects</i>

<b>Research Partners</b>	
<i>Oregon Built Environment &amp; Sustainable Technologies (BEST)</i>	<i>Oregon State University</i>
<i>Oregon Institute of Technology</i>	<i>Oregon Wave Energy Trust</i>
<i>Oregon Nanoscience &amp; Microtechnologies Institute</i>	<i>Portland State University</i>

<b>Public Partners</b>	
<i>Bureau of Planning &amp; Sustainability City of Portland</i>	<i>Department of Energy State of Oregon</i>