Bellevue Energy Efficiency Market Transformation Strategy

Strategies to Realize Energy Savings and Economic Development

FINAL REPORT

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About This Project

The Massachusetts Institute of Technology's Community Innovator's Lab Green Economic Development Initiative (MIT GEDI), and the City of Bellevue's Environmental Stewardship Initiative, partnered in January 2013 to develop an Energy Efficiency Market Transformation Strategy for Bellevue. This report documents the findings of this '"action research'" project. This work is intended to support Bellevue's ongoing economic development and environmental initiatives.

About MIT GEDI

MIT CoLab's GEDI supports economic development organizations pursuing the triple bottom line priorities of environmental sustainability, social justice and economic opportunity. To realize this vision, GEDI conducts applied research; develops tools and resources for practitioners; disseminates knowledge; and partners with economic development organizations to design strategic planning initiatives intended to transform economic development practice. GEDI is generously supported by grant from the Rockefeller Brothers Fund.

Executive Summary

The City of Bellevue has a compelling opportunity to realize economic development, and meet its environmental commitments, by supporting the local energy management sector. "Energy Management" refers to efforts to minimize buildings' energy costs and meet other energy-related goals. Effective energy management has been shown to reduce business' costs and create more profitable businesses; enhance the value of real estate; create economic activity and jobs in the local economy; improve the health of buildings; provide opportunities to build local clusters of energy service professionals; and contribute to greater environmental sustainability.

This report outlines findings from an analysis of market conditions in the energy management space in Bellevue, noting the various ways that realization of cost-effective energy saving opportunities could be realized. It then provides a series of recommendations for the City of Bellevue and its partners to consider in their efforts to realize greater uptake of good energy management.

MARKET CONDITIONS IN BELLEVUE

This study is comprised of an "Industry Analysis" to better characterize the extent of energy management practices in commercial, and associated markets for energy services, in Bellevue and the broader Seattle-Bellevue-Tacoma region. We found that:

The region is emerging as a hub of energy management services - Bellevue, as part of the broader Seattle-Bellevue-Tacoma regional economy, boasts strengths in energy service firms; architectural and engineering design services; the emerging "smart buildings" sector, which leverages IT to enhance energy management practices; and sustainable property management.

Energy service providers face a significant "early deployment" hurdle - Many building owners and utilities are unaware or wary of adopting novel technologies. There is a need to support existing regional efforts (such as the Northwest Building Energy Technology Hub) to connect entrepreneurs with institutions and building owners able to serve as "living labs" for new technologies.

There are extensive opportunities to improve the quality of energy management in all building types - Larger buildings typically have quite sophisticated energy management practices. Nevertheless, most buildings in Bellevue can save a significant percentage of their energy spending by realizing a greater amount of operational improvements and other "low-hanging fruit". Additionally, innovative financing mechanisms and services can enable deeper energy upgrades, with longer payback periods, in many different types of commercial buildings.

Smaller buildings, very roughly those under 50,000 square feet, have especially limited energy management capacity - Moreover, they have less developed vendor and financier networks offering them services to improve their energy use. Innovative programs and services are needed to grow the rate of adoption of energy management in these properties.

A comprehensive suite of energy programs are available in Bellevue, and higher levels of participation are warranted - The electricity and natural gas utility Puget Sound Energy (PSE) provides a comprehensive array of efficiency programs, providing incentives for most types of energy efficiency projects. However, some programs and

incentive applications need to be better streamlined. Participation rates are not nearly as high as is economically rational, from the building owners' perspective.

There is widespread industry support for Bellevue serving as educator and promoter of energy efficiency - The commercial real estate sector and the energy efficiency sector both expressed that the City of Bellevue has a role to play in facilitating knowledge of and engagement in energy management initiatives on the demand side of the energy service market. Some energy service providers noted that they believe the City and other regulators must play a strong role in regulating continued efficiency adoption.

A variety of innovative financing products are emerging in the region, which require support in early deployment - These financing mechanisms can address most of the barriers that keep buildings from undertaking energy management using traditional business finance sources (cash, business loans, etc.). The challenge is to educate building owners, property managers, and energy service vendors about the availability of these mechanisms, and to support early adopters in using these financing tools. Additionally, there is a need for more secure repayment mechanisms, such as on-utility-bill repayment.

A broader array of energy training opportunities exist for different occupations in the energy management sector, which require greater industry connections and support for student participation - A variety of workforce development programs exist to train new and existing building operators, facility managers, and energy service providers in strong energy management practices. Investing in Bellevue's human capital for energy management is likely one of the most effective ways that energy management can be improved in buildings.

RECOMMENDATIONS

These findings suggest a multitude of ways for the City of Bellevue and its partners to support the energy management sector. Section III of this reports provides a **detailed action plan** for Bellevue. It recommends that the City:

Lead by example in City buildings – The City of Bellevue should continue to pursue energy management opportunities. The City should especially focus on undertaking more comprehensive "deep" energy upgrades, and deploying more novel technologies in partnership with organizations such as the Northwest Building Energy Technology Hub (NBETH). In this way, City buildings can serve as a "living lab" for energy management innovations. To finance energy upgrades, the City should consider an internal revolving fund, amongst other options. Lastly, the City should take a more proactive role documenting its experiences with energy management, and sharing its successes and challenges.

Set community-wide targets – The City should set community-wide greenhouse gas emission and energy intensity targets that demonstrate a commitment to leadership, stewardship, and innovation. The City should consider adopting the Alliance to Save Energy's goal of doubling energy productivity by 2030.

Expand businesses engagement programs - The City of Bellevue has played a the leading role in establishing the Eastside Sustainable Business Alliance (ESBA), which hosted a Green Business Challenge in 2012. The City should build on such past successes by developing a program to engage commercial properties to improve their energy management. The City should aim for near-universal participation of buildings in its downtown, while coordinating with other C-7 cities to achieve economies of scale. The program should:

- *Provide participants with energy use information and building "energy analytics" feedback* – These services can allow for better insight into energy saving opportunities in buildings.
- *Provide the opportunity to develop "Deep Energy Retrofit Gameplan"* - This service will work with building owners to identify the timing, financing, and preliminary design considerations for future deep energy upgrades.

- F*acilitate property manager and building operator training* – The City should liaise with utilities and the state workforce development system to identify opportunities for co-funding existing worker retraining in energy management.

- *Facilitate internships for area energy management students* – ESBA should broker relationships between larger participants and community college internship coordination staff.

- *Recruit buildings to participate in the Northwest Building Energy Technology Hug (NBETH) and/or other technology demonstration initiatives.*

- *Aggregate small businesses* – ESBA and the City should partner to recruit small buildings into PSE's direct installation programs en mass. Additionally, it should issue an RFI to energy service providers, asking that they identify building typologies that they could serve with more holistic energy upgrades if ESBA were able to aggregate sufficient numbers.

Enact policies that drive energy investments – The City should adopt a "benchmarking and disclosure" policy, which requires that buildings above a certain size threshold (25,000 square feet is proposed) report their energy use to the City. This policy improves information transparency, a requisite for well functioning markets, by allowing prospective owners and tenants to understand energy costs. Numerous cities across the USA have adopted similar policies in recent years. The policy should be designed to be consistent with Seattle's benchmarking and disclosure policy, to reduce confusion in the region. Additionally, the City may consider mandatory energy assessment policies and/or mandatory improvements to existing buildings.

Support innovative project financing mechanisms - Traditional business financing tools (cash reserves, business loans, etc.) are often unsuitable to building energy upgrade projects. However, workable energy project financing mechanisms are increasingly available within the region. The City should work to educate businesses about these different financing options. It should also encourage Puget Sound Energy to adopt an "on-bill repayment" mechanism, through which other parties can finance energy upgrades to commercial buildings; alternately, the City should consider an on-bill repayment mechanism in its own utilities (water, etc.) that can serve as a repayment conduit for energy upgrades.

Support entrepreneurship in the energy sector – Bellevue's Office of Economic Development (OED) should assist energy efficiency startups and entrepreneurs access existing business development resources. Moreover, the City should work with various regional economic development organizations to support the energy services sector by:

- Exploring creating an energy efficiency or clean tech group within the Bellevue Entrepreneur Network.

- Branding Bellevue as a hub of energy services technology, R&D and entrepreneurship.

- Recruiting energy efficiency business professionals and technology experts into the technical assistance, training, and mentoring programs for local businesses across all industries.

- Creating an on-going training or knowledge development effort to keep business technical assistance providers up to speed on evolving EE technologies, tools, methods and referral options.

- Packaging information about business development resources specially for energy service industries.

- Support energy services and green design firms in growing their out-of-region market.

Invest in workforce and professional development - Throughout the region, a variety of workforce development programs provide training in energy management techniques, and pathways into energy management-related careers. However, these programs face the challenge of recruiting participants at a time when building owners and management firms are reluctant to invest in their

staff. To support workforce and professional development, the City could:

- *Establish a Bellevue Center for Applied Sustainability (BCAS)* - The BCAS would serve as a 'center of gravity' for sustainability learning. It could: Provide students better access to the business community for work-study training in energy management, and other sustainable business practices; provide students opportunity to manage day to day operations of business and community engagement programs, such as GreenWA and ESBA; and facilitate sharing of best practices by local businesses.

- *Explore opportunities to establish scholarships and/or "life-long learning accounts" in energy management professions.*

Implementing these policies will support Bellevue's economy: It will cultivate local energy management expertise, which may then be exported across the country and around the world. Moreover, energy savings will help promote a healthier, more employment-intensive economy. Finally, adopting these policies will increase the likelihood that Bellevue meets its commitments to reduce emissions and address climate change.

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I. Introduction

A. Purpose of this Report

This document reports the findings of a collaborative effort between the Massachusetts Institute of Technology's CoLab Green Economic Development Initiative (MIT GEDI), and staff at the City of Bellevue's Environmental Stewardship Initiative and Resource Conservation Management program. **The goal of this collaboration is to identify strategies to realize economic development in Bellevue, by growing markets for energy management and supporting the local energy services cluster.**

This report:

- 1. Outlines the economic case for speeding the uptake of good energy management practices in commercial buildings.
- 2. Summarizes the findings of our study of current energy management practices and the market for energy services in Bellevue, and the broader Seattle-Bellevue-Tacoma metropolitan region. This includes a summary of the various programs and initiatives that support energy management in the region.
- 3. Articulate roles that the City of Bellevue and its partners can plan in growing markets for energy efficiency services.

B. What is "Energy Management"?

"Energy Management" refers to efforts to minimize buildings' energy costs and meet other energy-related goals, such as environmental performance and healthy indoor conditions. Comprehensive energy management requires action by multiple stakeholders – Building owners; property managers; building operators; tenants; energy efficiency program administrators; third party consultants and energy service providers; financiers; and others. Energy management can entail a whole host of initiatives by these stakeholders. Important energy management practices include:

Adopting an energy management plan - Building owners are increasingly adopting energy management policies to guide efforts to improve energy management in their portfolios, including energy savings targets and responsible managers. Adopting such a high level commitment is a good early step in the energy management process.

Tracking performance via dashboards and benchmarking - You can't manage what you do not measure and track. Increasingly, building owners, managers, operators and tenants are making use of "energy dashboards". Such dashboards synthesize energy data from multiple sources (utility bill, equipment readings, etc.) and provide key information to owners, managers, operators, and other stakeholders. Many firms "benchmark" their buildings energy use to its historic use and that of peer buildings. The US EPA's Energy Star Portfolio Manager is the de facto national benchmarking platform, with 40 percent of commercial building space in the USA tracked in this system.

Operational improvements - How buildings are operated profoundly influences their energy use. By some estimates, half of all cost-effective energy efficiency opportunities can be achieved just by no- or low-cost improvements to existing systems (EON 2013). Ensuring building operators are properly trained is critical. Likewise, many real estate firms are incorporating energy performance criteria into building operators' and managers' job description, to incent improved performance. Additionally, building operations can be improved via a formal commissioning process.

Building commissioning - Commissioning services (or "tune-ups") involve a detailed assessment of building systems to ensure that all systems are functioning optimally in accordance with their original design intent, and correct any deficiencies. This service is typically provided by a specialist third-party commissioning agent. Commissioning encompasses a variety of techniques, including testing that equipment is in working order; calibrating sensors; reviewing building scheduling, and adjusting building air heating and conditioning set points accordingly; re-programming building controls; and other techniques.

Commissioning has traditionally been offered as a short term service (perhaps lasting a few months), ideally repeated every 2-5 years to ensure the building remains in working order. However, novel "on-going commissioning" services are increasingly becoming available. These services use data from building systems controls and meters, streaming this data through computer applications to identify energy saving opportunities in real-time.

Commissioning has tremendous potential to reduce energy use. The most comprehensive national survey of building commissioning project reveals a median 22% savings in energy costs for office buildings (16% for all building types), with a payback time of 1.1 years. Yet, perhaps only 5 percent of the market potential of commissioning has been realized; the vast majority of appropriate buildings do not undertake regular comprehensive retro-commissioning (Mills 2011).

Capital upgrades - In addition to operational improvements, many energy efficiency opportunities involve "upgrading" building equipment and systems with more efficient systems. Often, upgrades to systems occur only once systems reach the end of their life; however, savvy building owners and managers will pro-actively replace systems when doing so lowers net costs. Upgrades can be classified into two types:

- **Standard upgrades** - A variety of upgrades

that entail relatively prescriptive equipment replacements, which necessitate minimal interruptions to building users and thus can be implemented at most times in a buildings' life cycle. These standard upgrade measures typically involve lighting and simpler HVAC equipment replacements. Such standard upgrades typically yield 15-25 percent energy savings, with energy savings paying back the cost of upgrades in 2-5 years.

- **Deep energy upgrades** – These upgrades aim to achieve greater than 40% energy savings. Deep energy upgrades include major HVAC systems redesign and improvements to the building envelope, in addition to the measures included in standard upgrades. Increasingly, renewable energy deployments are becoming cost-effective in different parts of the country as well. Deep energy upgrades are best realized through an "integrated design process", involving the building owner; architect and engineering design teams; financial decision-makers and advisers; and building operations staff. Frequently, deep upgrades can realize even greater financial performance that standard upgrades in terms of the projects' net present value, though deep upgrades may entail longer payback periods. However, deep upgrades often only make sense at certain milestones in buildings' life, including: Renovation; near-end-of-life building roof, windows, siding or HVAC replacements; new acquisition or refinancing; or major new tenants. At these times, deep upgrades are less disruptive and owners can roll the costs of upgrades into other financing sources.

Occupant/tenant engagement - Building occupants' behavior has a profound effect on buildings energy use. Many energy management efforts include occupant engagement, aimed at changing behaviors that effect energy use.

Establishing "green leases" - Green leases include provisions that encourage both tenants and owners to pursue cost-effective energy management strategies, and align their interests in pursuing good energy management. Important provisions include:

- "Pass through" provisions, whereby owners can pass the costs of energy management projects that save tenants on their utility bills through to tenants.
- Allowing the owners' energy service providers and/or building engineers to review tenants' space design during tenant improvements, to suggest better choices.
- Specifying tenants energy consumption targets and/or equipment that will not be included in the building (incandescent light bulbs, non-Energy STAR appliances, etc.).

C. Economic Benefits of Good Energy Management

When greater proportions of buildings in a city or region adopt stronger energy management practices, the aggregate benefits for the local economy can be substantial. The subsections below explore these benefits.

Enhanced Business Profitability

Reducing operating costs by lowering energy spending realizes greater profits for businesses. Energy and other utilities comprise a significant portion of non-labor operating costs for buildings. The effect on businesses' net profits can be especially profound for businesses with low profit margins, and for whom energy costs make up a large percentage of their operating costs. Analysis by the Seattle-based Preservation Green Lab provides a useful illustration of these dynamics: As restaurants and groceries have low profit margins and high energy costs, they can realize significant increases in their net operating income by reducing energy spending. While the percentage increase in office property profits are not as great, they can still result in large aggregate savings, and significant enhancements to the value of the property.

Enhanced Value of Real Estate

Lower operating costs, healthier buildings, and a "green" brand, can add to building values and rents, as occupants are willing to pay more to locate in such buildings. The Institute for Market Transformation's meta-analysis of national studies investigating the impact of LEED and ENERGY STAR rating on real estate performance has found consistently positive premiums on rents, sales price, and occupancy (see Figure 2).

Job Creation

Energy management can meaningfully increase the amount of employment opportunities available in local economies. Energy efficiency engenders economic activity and a net increase in jobs in one of two ways:

- ***Jobs are created due to investments in energy management*** ("investment related

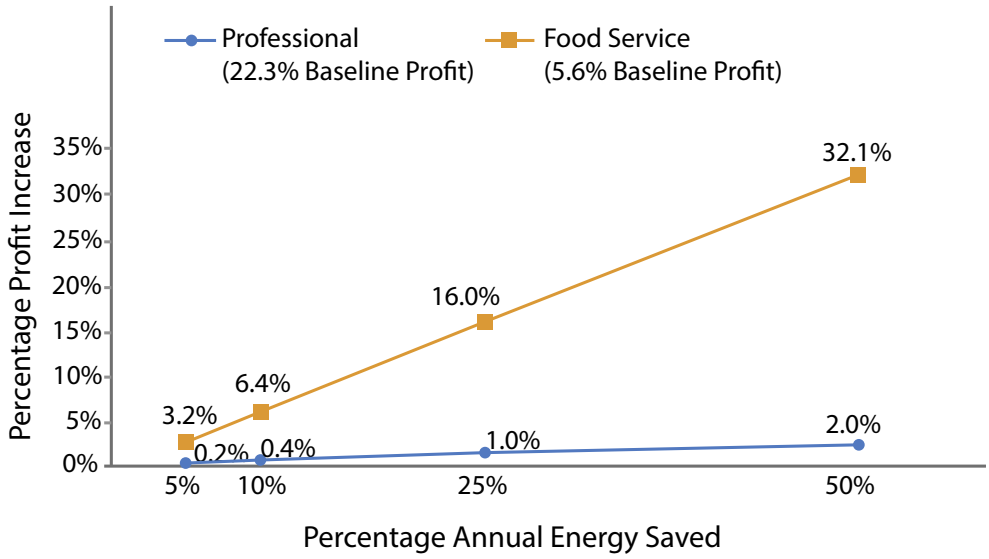

Figure 1: Increase in profits associated with energy savings. Source: (NTHP PGL 2013)

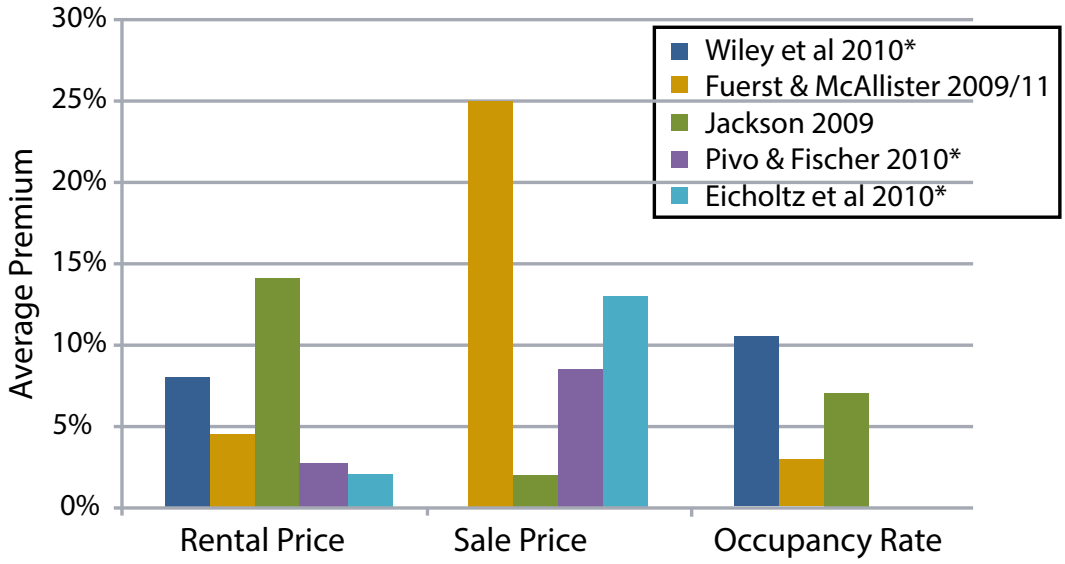

Figure 2: Premium associated with green rated commercial real estate - results from multiple studies. Source: Institute for Market Transformation.

jobs"): Short-term spending on energy projects leads to direct, indirect, and induced jobs. Job creation begins when an energy efficiency project is undertaken and workers are needed, thus leading to the creation of direct jobs. Indirect jobs are created when suppliers of energy management products (HVAC systems, insulation, etc.) bring on more workers to produce goods. Finally, all these workers spend their earnings in the local economy, realizing further economic activity and job impacts.

- ***Jobs are created due to the reinvestment of energy savings*** ("savings related jobs"): As energy savings are shifted away from spending on utilities, and towards more labor-intensive sectors of the economy, increased jobs and economic productivity are realized.* Thus, investments in energy efficiency entail an "import substitution" strategy, as less energy per unit of economic product will be need to be imported to the region. These import substitution effects are likely stronger in metropolitan regions, as most metropolitan regional economies do not have a large number of jobs in fossil fuel supply sectors.

Appendix 1 summarizes a number of studies that estimate the increase in net jobs associated with policies that encourage investments in energy efficiency. This net increase in employment is about 1-2% in most of the regions studied, and all studies suggest that energy savings policies will realize net positive economic outcomes. However, the impacts suggested by these studies differ substantially, ranging from about 0.2% in some locales, to about 8% in the Northeast states. These differences in employment projections are the result of a number of factors: Each study estimates regions' energy efficiency potential differently, and conducts the analysis over different time horizons. Additionally, regions differ in the structure of their economy, and the price of energy; these differences profoundly influence the macroeconomic impacts of investments in efficiency. Finally, these studies differed in their economic modeling methodology.

To get a strong understanding of these dynamics in Bellevue and/or the broader Seattle-Bellevue metropolitan region would necessitate a detailed

* Nationally, the energy generation and distribution sectors have a job intensity of 10 jobs per $1 million spent in these industries. In comparison, the economy as av whole has 17 jobs per $1 million spent (Bell, 2012). Thus, shifting utilities spending to other economic sectors realizes job growth.

econometric study of the region. However, it is safe to conclude from the literature that while not representing a silver bullet, investments in energy management can contribute meaningfully to a healthier and more job-intensive economy.

Health and Productivity Improvements Associated with Building Design & Energy Management

Building energy upgrades can also realize health and productivity improvements for employees working in these buildings. Appendix 2 summarizes MIT GEDI's literature review of studies evaluating the link between energy management initiatives and improved occupant health. The balance of evidence suggests that:

- ***Energy efficient building design and good energy management practices can improve worker performance.*** A number of studies have shown that measures such as temperature control, improved indoor air quality, lighting system quality, and access to the natural environment can both reduce buildings' energy use and improve the individual performance of employees working in those buildings. Workers accomplish their objectives in shorter amounts of time and in general demonstrate individual productivity gains. Some studies suggest that investments in efficiency and healthy buildings are also associated with decreased churn costs, or the costs associated with employees leaving a company and necessitating replacement.

- ***Energy efficient building design and good energy management practices can improve worker health.*** Investments in energy efficiency and improved building performance can realize positive impacts on workers' health and well-being. In particular, upgrades have been shown to address indoor air quality and reduce sick building syndrome.

- ***The health and productivity benefits result in an even more compelling financial case for energy management.*** Employee and labor costs typically exceed the costs of space for firms by well over an order of magnitude; therefore, small incremental improvement to occupants' health and productivity associated with energy management initiatives can realize substantial lifecycle savings for building occupants.

These effects will likely be most pronounced when owners, design teams, operators and managers explicitly aim to improve indoor health and conditions as part of their energy management practices. Thus, improved health and wellbeing should be a key focus of energy management initiatives.

Development of Energy Services Clusters

When regions forward strong energy management in their commercial building stock, local firms have tended to emerge to serve this space. In turn, local firms will serve markets for energy services outside the region, creating an "exportable cluster" that can bring wealth into the region. Indeed, Section II-B makes clear, Seattle-Bellevue-Tacoma region has lead in energy policy and possesses a variety of comparative advantages, which together have resulted in a nascent cluster of firms providing energy management services. The potential to capitalize on the global growth in demand for energy management in commercial buildings is substantial. Pike Research estimates that the global market for energy upgrades in commercial buildings will double from $80 billion in 2011, to $151 billion in 2020, with much of this growth coming in Asia Pacific and North American markets that may be accessed by local firms (BusinessWire 2012).

II. Energy Service Market Conditions in Bellevue and the Seattle Metro Area

A. Methodology – Regional Industry Analysis

As documented in Section I above, fostering better energy management can realize a variety of economic development and environmental benefits.

This Section II aims to better characterize the extent of energy management practices, and markets for energy services, in Bellevue and the broader Seattle-Bellevue-Tacoma region, and to identify important barriers impeding the functioning of markets for energy services. To make this characterization, MIT GEDI and the City of Bellevue engaged in an "Industry Analysis". This industry analysis broadly follows the market research protocol described in Michael Porter's Competitive Strategy: Techniques for Analyzing Industries and Competitors (Porter 1980). The Industry Analysis included:

- A review of existing publications on: The energy efficiency potential of commercial buildings in the Pacific Northwest; the local real estate market; the economic development potential and needs of the energy sector; local energy sector workforce, and workforce development needs.
- An internet review of existing regional energy efficiency programs; energy efficiency financing programs; economic development initiatives; workforce development initiatives; energy management certifications offered by community colleges and other educational institutions.

Interviews with approximately thirty participants in the commercial energy services sector, including energy service providers; real estate organizations representing regional building owners, developers and managers; individual property owners and managers; workforce development organizations; community college energy management faculty; and government staff.

- A survey of 16 local energy efficiency firms (results summarized in Appendix 3) and telephone interviews with eight property managers and/or building owners (results summarized in Appendix 4).

B. The "Supply Side" of the Energy Services Sector

In the Seattle-Tacoma-Bellevue region, a variety of different types of firms provide energy management-related services for buildings. Some of these industries represent industrial clusters, with potential to export energy services and products outside of the region. The different components of this broad energy services cluster include three "layers": The "core" cluster, "linkage" industries, and "peripheral" sectors (Figure 3). In the sections below, we profile these different layers and the industry sectors within each, noting pertinent conclusions from our industry analysis.

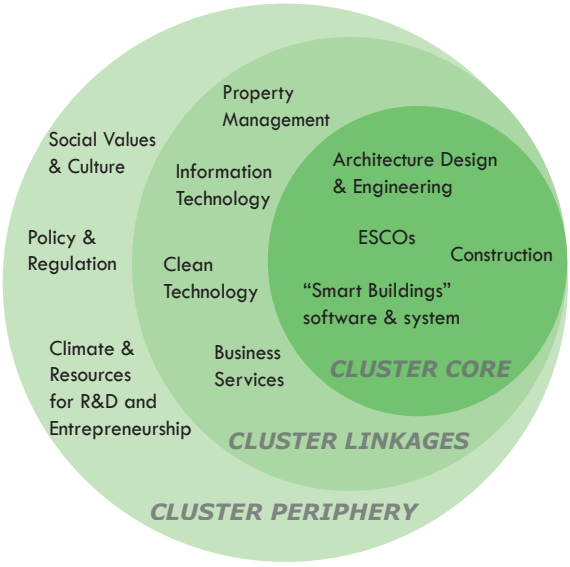

Figure 3: Industry Layers of the Energy Efficiency Cluster

Cluster core: Energy Efficiency Product and Service Providers

The Seattle-Tacoma-Bellevue Region and Washington State are highly competitive in the sectors that comprise the "core" of the energy management cluster. The region possesses high job concentrations and a number of national leading firms in these industries: A survey conducted by Washington's Employment Security Department identified 38,920 jobs in energy efficiency area (37,449 or 96.2% in private sector) in the State in 2011, representing 32.4% of all green jobs (WSESD 2011). These jobs are especially concentrated in the following sectors: Energy Service Companies; Architectural Design & Engineering; Construction; and an emerging "smart-buildings" sector. We further profile each of these sectors below.

ENERGY SERVICE COMPANIES

Energy Service Companies (ESCOs) provide dedicated, turnkey energy management projects for clients. Our industry analysis suggests that:

The region possesses a strong cohort of ESCOs – As of 2013, ten of the thirteen firms are designated as the Washington State's ESCO Partners are located in the Seattle-Tacoma-Bellevue Region. These firms include: McKinstry, MacDonald-Miller Facility Solutions, Integrity Energy Services; Hermanson Company, University Mechanical Contractors, as well as major national ESCOs. These firms make up a strong regional ESCO industry with diversified products and services.

In-region ESCOs have the potential to export services, products, and expertise to other regions of the country – For example, McKinstry currently exports energy services to over 16 regions around the country via regional offices in Texas, Los Angeles, California, Boise, Colorado, etc. These offices maintain a flexible operation process, sub-contracting projects to local companies or bringing staff from headquarters according to individual project. McKinstry also has a national team to conduct projects in places where there is no office.

I*n-region ESCOs have significant on-site advantage over out-of-state industrial giants* – A number of national and international industry giants in building engineer and electronic engineer sectors (for example, Schneider Electric, Trane, Johnson Controls) have energy services branches or regional offices in this region. However according to one interviewee, relatively little of the regional market

is served by these large out-of-town ESCOs, due to the strong position of local firms and the in-region capacity of conducting projects cost-effectively.

Regional ESCOs are innovating new services and businesses that will provide energy management for previously underserved markets, including commercial buildings and smaller projects – Historically, the ESCO industry have focused on larger projects in the "MUSH" market (municipal and state governments, universities and colleges, K-12 schools, and hospitals). Indeed, national surveys of the ESCO industry collectively conducted by Lawrence Berkeley National Laboratory (LBNL) and National Association of Energy Service Companies (NAESCO) found that due to various market barriers, the commercial and industrial (C&I) sector only accounted for about 7% of ESCO industry revenues in 2008 (Satchwell, Goldman, et al., A Survey of the U.S. ESCO Industry: Market Growth and Development from 2008 to 2011. 2010) Likewise, the prominent local ESCO McKinstry estimates it derives 90-95% of its energy services revenues from the MUSH Market, and only 5-10% of its revenues from the C&I sector.

However, other firms such as MacDonald-Miller have been pioneering services to private buildings, using innovative financial tools to overcome the prevailing market barriers in the private market., which shows great potential for private market- focused ESCOs to develop innovative service offerings and growth businesses.

In terms of the diversity in project scale, some of the more prominent regional ESCOs note a minimum project threshold of $150k, and smaller firms such as Integrity Energy Services are able to handle projects with the dollar contract value down to $40k due to its lower internal operational cost. An interviewee also noted the convenience of building long customer relationships by starting from smaller projects. This contrasts with many other regions where the ESCO industry only cover projects with at least $500k of deal flow, and indicates the business potential for local ESCOs with expertise in small commercial buildings projects.

The shortage of a qualified and experienced workforce in several industries is impeding the expansion of energy efficiency market – A number of interviewees noted that the retiring of senior technicians and a shortage of qualified younger workers, especially in the engineering and construction industries, are making it harder for them to grow business and export services.

ARCHITECTURE DESIGN AND ENGINEERING

The Seattle-Tacoma-Bellevue Region and Washington State possess strong architecture and engineering sectors, evidenced by their high location quotient and concentration within the region (see table 1). Moreover, the region is particularly strong

Table 1: Location Quotient of Building Design & Engineer Occupations*.

	SEATTLE-TACOMA-BELLEVUE (2012)		WASHINGTON STATE (2012)		WASHINGTON STATE (2011)
	# of Employees	LQ	# of Employees	LQ	# of Employees (Energy Efficiency related only)
Architects	2700	2.52	3220	1.81	1760
Civil Engineers	6570	1.96	12130	2.19	N/A
Electrical Engineers	N/A	N/A	5330	1.54	3618
Mechanical Engineers	3650	1.11	5630	1.04	660
Engineers All Other**	2520	1.59	3560	1.35	1107

* Data source: 2012 employment data from U.S. Bureau of Labor Statistics, Occupational Employment Statistics; 2011 employment data from Employment Security Department, 2011 Washington State Green-Jobs Survey

** The "Engineers All Other" category covers all the engineer segments except for Civil Engineers, Electrical Engineers, and Mechanical Engineers. Within this category, "Energy Engineers", "Wind Energy Engineers" and "Solar Energy Systems Engineers" are most related to the energy efficiency cluster.

in green, energy efficient building design.

The region has long been recognized as a leading center of green building with high LEED building deployment – Seattle Metro area has 339 LEED certified projects with a total area of 71.8 M square feet, ranking 4th and 5th respectively in per capita terms among the 50 metropolitan areas around the country (CleanEdge 2013).

The strength in green design has been driven by government policy – Interviewees noted that they felt the region's strength in green design has been substantially driven by a progressive building code and green purchasing policies of government.

A significant proportion of the design and engineering firms active in the region are located in Bellevue – Of the 19 firms operating in local engineering design market, five are based or have regional office in Bellevue, including Eaton Corporation, HDR Engineering, MacDonald-Miller, CH2M Hill, and Wood Harbinger.

Regional universities and research institutions help maintain the technology advantages of firms and support green skill enhancement – The University of Washington (UW), Washington State University (WSU), and Pacific Northwest National Laboratory (PNNL) not only lead cutting-edge academic research on energy efficiency, but also maintain communication with the industry via collaborative programs such as UW Integrated Design Lab and the WSU Extension Energy Program. This interaction enables them to identify the promising research topics, and speed the adoption of new technology by the industry.

"SMART BUILDINGS" SOFTWARE AND MANAGEMENT SYSTEM

A promising field in energy efficiency is at the nexus of information technology and building energy management, where a variety of firms are emerging and gradually clustering in major IT and/or building science centers across the USA. Such firms develop novel means of managing facilities' energy, controlling energy loads to respond to real-time grid conditions, using automating diagnostic analytics to detect and identify energy savings opportunities, amongst numerous other emerging service areas. These firms comprise an important, diverse portion of the broader "CleanTech" space. One attempt to classify this diverse industry is provided in Figure 4.

Several locally or regionally-based firms are recognized as leading innovators and represent the region's potential in this promising field – Those located in Seattle-Tacoma-Bellevue region include Energy Savvy, Ecova, and Microsoft.

Some of the sophisticated management systems and expertise that were developed in-house are being tested to apply to external markets. For example, Microsoft has developed a cloud-based energy management system, which includes automatic fault detection diagnostics, energy management analytics, and alarm management. The system was first piloted on 13 buildings (2.6 M sq. ft. total) within Microsoft headquarters campus. Now Microsoft is collaborating with Accenture to apply the system in the 90M sq. ft. Seattle 2030 district, and has the long-term plan to explore city-scale application.

Availability of capital for new ventures and services – The region boasts relatively high availability of capital for new ventures & services in the region helps to drive business growth, investment, and construction. As one interviewee noted, there is a decent amount of reasonably wealthy people who are not afraid of making higher-risk venture investment, especially in the green economy. By one account, Washington saw over $635 million in clean technology venture capital investment between 2006-2008, ranking the fourth following California, Massachusetts and Texas (Pew Charitable Trusts 2009). During the same period, the state ranked first in employment growth (5.65 percent) and revenue growth (13.45 percent) of venture-backed companies (National Venture Capital Association 2009).

Presence of incubators, research institutions, and industry organizations – A variety of business incubators, research institutions, and industry organizations are already supporting the emerging energy efficiency cluster. These organizations cover a wide spectrum of key development elements from technology innovation and commercialization, to entrepreneur incubation and market promotion (Figure 5: Spectrum of key market development

FIGURE 4: ONE CONCEPTION OF THE SMART BUILDINGS SOFTWARE AND ENERGY MANAGEMENT SPACE. SOURCE: GROOM ENERGY 2013.

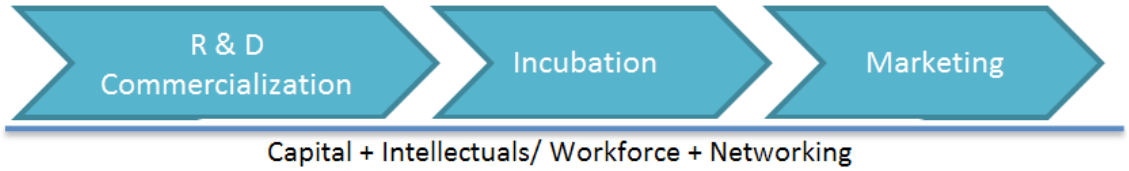

FIGURE 5: SPECTRUM OF KEY MARKET DEVELOPMENT PROCESSES.

processes.).

These organizations build on the region's existing advantages in the energy service sector by developing platforms to bring together the various stakeholders, including entrepreneurs, investors, industry leaders, researchers and the public, and bridging the information and communication gaps among them. Appendix 5 lists a few of the organizations frequently mentioned by interviewees.

The lack of deployment of private and public funding is hampering the region's R&D and entrepreneurship – At the State level, venture capital investments in Washington's cleantech sectors have been cast as weak compared to other cleantech benchmark states (EnterpriseSeattle 2011). Concerns about state and federal regulation and an uncertain policy environment may not provide adequate or stable incentives for growth in green industry sectors and jobs continue to be raised as impediments to sustained action in a chal-

lenging economic environment (Navigant 2010). At the Seattle Metro level, a comparison among six metropolitan regions with active R&D and entrepreneur activities indicates that the Seattle region is relatively disadvantaged in private R&D funding and venture capital, and has weaker link to the public funding sources (Prosperity Partnership; Puget Sound Regional Council; TIP Strategies 2012). Interviewees also noted that a lack of opportunity for protecting significant market share via intellectual property has led venture capitalists to hesitate to invest in companies, making it challenging for some energy service firms and "smart building" services firms to reach significant scale.

The long lead times to go to market make it difficult for entrepreneurs to succeed – Utilities and the real estate industry represent a conservative, slow-moving source of demand, which does not deploy new technologies rapidly. They are especially slow to adopt novel services and technologies. Numerous interviewees and previous analysis by the Brookings Institution noted the need for assistance in brokering early stage deployment of efficiency services, particularly more novel services, and performance data to build market acceptance.

Cluster supporters: Energy Efficiency linkage industries

A variety of industries are related, though not core, to the efficiency services space – we term these "linkage" industries. These industries stand to grow, and develop innovative new exportable offerings, as markets for energy services expands. Bellevue's existing competitive advantages in these areas indicate that the City has the potential for cluster development in these linkage sectors as well.

PROPERTY MANAGEMENT

The region's strong property management sector is represented by a large amount of sophisticated professional property managers, and a number of firms that are differentiating themselves on the basis of strong energy management and sustainability capabilities. For example, JSH Properties, a Seattle-based property management company, has been extensively engaged in sustainability initiatives

Table 2: Location Quotient of Real Estate & Property Manager Occupations*.

	SEATTLE-TACOMA-BELLEVUE (2012)		WASHINGTON STATE (2012)		WASHINGTON STATE (2011)
	# of Employees	LQ	# of Employees	LQ	# of Employees (Energy Efficiency related only)
Property, Real Estate & Community Association Managers	3,010	1.45	4,230	1.23	N/A
Business Operations Specialists**	17,530	1.45	24,620	1.23	N/A
Managers All Other	4,940	1.12	7,370	1.01	369

* Data source: 2012 employment data from U.S. Bureau of Labor Statistics, Occupational Employment Statistics; 2011 employment data from Employment Security Department, 2011 Washington State Green-Jobs Survey

** The "Business Operations Specialists" category covers a wide range of occupations of which two are related to the energy efficiency cluster: "Energy Auditors", "Sustainability Specialists".

and has in-house experts to push energy efficiency undertake among its client buildings by providing consulting on policies and financial tools, and helping clients navigate the programs and processes of utilities and ESCOs.

Moreover, the region's large employment base in a broader array of property management occupations and the relatively fewer managers that directly participate in energy efficiency-related work (as shown in Table 2) illustrates the potential of the property management community to develop energy efficiency know-how and support energy concerned management expertise outside the region as these services become more valued in the market.

INFORMATION TECHNOLOGY

The existing IT industry cluster in the Seattle-Tacoma-Bellevue region, especially in Bellevue and Redmond, supports the region's potential in leading in the integrated and cloud-based automation building energy management technology field. The cooperation and competition among the firms, and their geographic proximity to the regional energy efficiency research and R&D community, can help facilitate Bellevue's developing IT-based energy efficiency technologies, tools, and expertise.

BUSINESS AND FINANCIAL SERVICES

Financial services firms, such as Energy Efficiency Finance Corporation, have developed innovative financing tools that can serve previously untapped markets for energy services (see Section II-E below). Likewise, local firms have played leading roles in consulting on national and international energy finance programs. These tools and programs have potential to continue to scale, which can support a local energy financial services cluster.

C. The "Demand Side" of the Market

Market Segments

Interviews with market participants suggested that, for the purposes of the City of Bellevue's goals to increase demand for building energy services on commercial buildings, the customers for efficiency service can be segmented into two broad, internally diverse building types: Larger and smaller buildings.

LARGER, HIGHER CAPACITY BUILDINGS

Very generally, these buildings are greater than 50 thousand square feet. Building types in this category include Class A and some Class B office space, "big box" retail, and larger institutional buildings. As noted in Figure 6, these larger building types make up 66% of floor space in Bellevue, making them the dominant energy user in the region. Interviews with stakeholders suggested important conclusions about these building types:

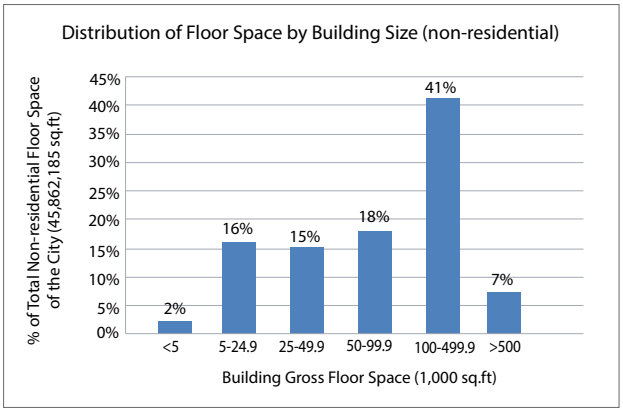

Figure 6: Distribution of floor space by building size in bellevue (non-residential).

Relatively high capacity of owners and management - Owners of these buildings tend to possess high financial literacy, and are cognizant that energy management can help enhance the value of their property. These buildings are typically professionally managed by more sophisticated property management firms. Property managers will spend a greater percentage of their time serving individual properties; many property managers will be solely responsible for one property. Likewise, these buildings are likely to have a fulltime building engineer responsible for operating the building, with strength in energy management.

Conscious engagement in energy management - Owners/managers of these properties frequently benchmark energy use, and will semi-regularly undertake some form of building energy assessment to identify upgrade opportunities. These larger buildings represent the large majority of the private-sector revenue of ESCOs and Smart Buildings entrepreneurs serving the area. These service providers and building managers help owners navigate the array of utility energy efficiency programs offered to them.

Still extensive energy efficiency available - Despite their cognizance of the cost savings opportunities energy management provides, most of these larger building types have not invested in anywhere near all cost-effective energy management strategies possible. Indeed, many interviewees suggested that even the more sophisticated properties that purposefully engage in energy management typically only invest in efficiency measures with a 2-5 year payback or less. Thus, they typically miss out on all upgrade opportunities with longer time horizons. Additionally, energy management consultants report that they frequently identify multiple shorter-payback opportunities, suggesting that there is still plenty of low-hanging fruit to pluck in these buildings. Our interviews suggested that there is significant variation in the capacity of owners and managers to identify energy saving opportunities, and that sharing best practices can be beneficial for many buildings.

Available suppliers of energy upgrade and management services - The market channels to deliver services to these buildings are established; what is required is for buildings to have greater motivation and enabling financing mechanisms to realize deep energy efficiency.

SMALLER, LOWER CAPACITY BUILDINGS

Very generally, these buildings are less than 50 thousand square feet, comprising perhaps 33% of

Bellevue's floor area. Property types include some Class B and C office; smaller format retail; restaurants; and other smaller properties.

Limited formal management - Often, these smaller buildings are not professionally managed, or the property manager will devote limited time to the property. Likewise, buildings are operated by personnel with less experience, capacity, and time to devote to these individual properties; frequently, operations staff will be comprised of owners, augmented by contractors who service equipment.

Very little cognizance of energy savings opportunities - Most smaller properties engage in little or no proactive energy management. They do not benchmark performance, and are unlikely to undertake regular assessments of upgrade opportunities. Rather, energy management typically occurs on a de facto, as-needed basis, when building systems fail.

Limited supply chains for energy upgrades and energy management services - The supply chain for serving these properties is less robustly developed. While some contractors and a few engineering energy service providers serve these buildings, smaller properties have far fewer vendors offering them energy management services. Utilities offer these buildings "direct install" programs, implementing obvious energy upgrade opportunities. Only a select few will pursue utilities' custom grant programs (see section II-E for more detail on utility efficiency programs).

Need for specialized, turnkey services to emerge to serve smaller buildings - Our interviews suggested that engaging greater numbers of small buildings in energy management will require turnkey services and financing, with greater "handholding" of owners; aggregation of properties to pursue upgrades services, and receive financing simultaneously; and coordination with HVAC, controls, and lighting contractors serving these properties, to incent them to pursue stronger energy management solutions.

Market barriers common to all properties

Our interviews suggest that a variety of barriers impact both property types, severely curtailing the extent of energy management in most private commercial properties below what is economically optimal.

The "hold barrier" - Institutional buildings (government, universities, schools, hospitals), owner-occupied buildings, and developers who intend to hold properties for longer periods of time, are more likely to invest in deeper energy management, and install measures that will take many years to pay off. In contrast, many owners anticipate that they might sell the property in the shorter term (within perhaps 5 years). These shorter-term owners are hesitant to invest in energy upgrades beyond this timeframe. Many interviewees noted that this dynamic presents one of the most important barriers to widespread uptake of deep energy upgrades in the region.

The "split incentive" – Buildings that are owner occupied have a strong incentive to invest in energy efficiency. However, in rental properties, owners will often invest in energy efficiency, while renters will reap the savings. Unless there is a mechanism to "pass through" the costs of upgrades to renters, owners will be hesitant to invest in energy efficiency unless it is strongly demanded by tenants. In turn, tenants often have very limited information about the full-range of energy management strategies employable in a building.

Out-of-region ownership – Some buildings are owned by regional owners, who are active in BOMA, cognizant of local programs, and active in local networks; these connections facilitate communication with these owners. In other properties, ownership is organized via a Limited Liability Company (LLC) and/or Real Estate Investment Trusts (REITs), whose ownership is often outside the region. More distant ownership makes it difficult for energy service firms, and energy programs, to reach buildings' financial decision-makers. Many service providers cited this as a very important barrier.

Lack of capacity to fund upgrades or assume debt – Some owners have sufficient cash reserves to fund upgrades, or ready and extensive access to credit. However, many building owners (especially LLCs) have limited cash reserves and are highly leveraged. They therefore face high investment

"hurdle rates" that they apply when they consider upgrades, only accepting upgrades with a very high rate of return and a commensurately short pay-back. Without access to credit, these buildings will not invest in deeper energy efficiency measures.

Limited understanding of more novel energy services – Large buildings have greater sophistication than small properties. Nevertheless, many property managers and owners have very limited understanding of cost-effective efficiency opportunities in their properties. Likewise, they typically have limited experience and understanding of administering energy performance contracts, administering building commissioning and other operational energy service contracts, and using novel energy upgrade financing mechanisms.

Limited property management incentives to advocate for efficiency – Energy management projects are affected by the relationships and communication between building owners, property managers, and building operations personnel. Property managers typically will not advocate strongly for an idea not embraced by a building owner.

D. Utility Rate-payer Funded Energy Efficiency Programs

Puget Sound Energy (PSE) delivers a suite of rate-payer funded* energy efficiency programs, which are available to commercial buildings in Bellevue. Currently, PSE's portfolio of programs includes:

- **The Commercial Custom Grant Program** – This program provides grants based on the volume of energy savings. It is typically used for more comprehensive, unconventional building upgrades. Customers can receive guidance from PSE staff directly, but will more often engage with a third party contractor who helps deliver the project.

- **Resource Conservation Manager (RCM)** – PSE sponsors an RCM (~$25k/yr) to work in organizations and implement energy management projects. The RCM is expected to help reduce energy by 10 to 15% in the first three years. About 400 properties are eligible in PSE's territory – the RCM should be responsible for energy management in at least one million square feet of property, or have $2M in annual utility spending.

- **Comprehensive Building Tune Up (CBTU)** – PSE funds a commissioning service provider to undertake comprehensive building commissioning services. The owner must commit to implement all measures discovered with a 2 year or less simple payback. This program includes about 50 hours of training for buildings' operations and management staff, to help implement operational energy savings. Most participating buildings will be larger than 50,000 square feet.

- **Simplified Building Tune Up (SBTU)** – PSE funds a simpler commissioning assessment, and provides operators with guidance in how to implement recommendations.

- **Commercial rebates** – PSE provides incentives for single replacements of equipment. Often, contractors will deliver only one or a few efficiency measure installations.

Increasing the participation rates of Bellevue commercial buildings in these programs is a potent means of improving energy management in Bellevue. A number of findings pertinent to Bellevue's efforts to grow markets for efficiency are made in the following pages.

Efficiency programs face challenges originating clients and keeping participants engaged

PSE's Building Performance Team manager states that the "Hardest part is getting clients interested in the first place." Helping to facilitate commercial buildings' knowledge and interest in such programs is an important role for the City of Bellevue to play. The following points provide further context from our research.

Many organizations, especially in the private sector, have yet to take advantage of PSE programs – Overall participation levels in building performance programs are low compared to total PSE's customer base. The RCM, SBTU and CBTU programs in particular have proven difficult to scale participation, despite their proven cost-efficacy and value-proposition for clients. The following bullets provide further information regarding participation from a few of PSE's programs:

- RCM – There are about 400 qualified customers, and about 100 are participating. Only about 16% of RCMs serve the private sector, despite a significantly higher percentage of qualified customers being from the private sector.

- CBTU – 14 customers, 30 projects, 48 buildings. Numbers are to date since the program started in 2010.

* "Rate-payer funded efficiency programs" are funded by a small surcharge on utility bills. They are mandated by utility regulatory bodies. They comprise the dominant source of funding for utility program administration, and incentives for energy upgrades.

- SBTU – The goal is to have 75 sites, currently 27 sites enrolled.

Lower capacity partcipants are less likely to undertake programs – Program staff note that customers with high capacity and knowledge of energy management are most likely to participate in their programs. However, many potential beneficiaries do not possess sufficient managerial capacity to take advantage of programs. This is especially true of more comprehensive, "whole building" retrofits, which stand to achieve the greatest energy savings.

Serving small business customers requires streamlined approach – PSE recognizes that small businesses have especially limited capacity to participate in their programs. Therefore, PSE recently initiated a "direct install" program as part of its commercial rebates, focused on small business. The program entails visiting small businesses door-to-door for a quick energy performance assessment and mobilizing a contractor to do the work. The work is paid for by PSE, if it meets the cost-effectiveness criteria. Costs are kept low by concentrating a number of small projects in one location. The target is to reach a few thousand small businesses every year. There is an opportunity to host such neighborhood based recruitments in Bellevue.

Customers may lose interest over longer program delivery cycles – For example, the CBTU and SBTU programs require multiple months of building energy information data. PSE staff note that customers may lose interest as this information is collected and analyzed.

Inadequate metering infrastructure on some properties – Commissioning services offered by the SBTU and CBTU programs require 15 minute interval data. Many properties that would otherwise be eligible do not yet have metering services recording consumption data at this level of granularity.

Programs that aim to achieve operational savings face concerns over persistence of savings, and require further education of building management and operations staff – The RCM, SBTU and CBTU programs rely on good building operations to generate energy savings – good operations must be maintained over time. Quite often, when an RCM leaves an organization, the savings are lost over a few years as building operations "forget" the importance of energy. Likewise, the SBTU program has faced the same problem with persistence of energy savings, as building operations are handed back to existing building operators, following PSE's recommendations. Programs would benefit if building management and operations staff had greater energy management capacity.

PSE faces regulatory barriers to rapidly investing in all cost-effective energy efficiency

In Bellevue energy efficiency programs are administered by a utility, PSE. Utility administration can have a variety of advantages: Utilities are well positioned to communicate with customers about energy saving opportunities; they can conduct analytics of efficiency opportunities; and, perhaps most importantly, they have the scale to administer programs. However, utility administration does have some drawbacks, including:

- **Limited incentive to achieve market transformation** – PSE receives ratepayer-funded revenue for documented energy efficiency projects it helps implement. However, it has little incentive to invest in market transformation efforts, such as greater knowledge and education, which do not immediately lead to documentable savings, but which can enable significant energy savings over the long term. If PSE cannot document a discrete level of energy savings, it will be difficult claiming such activities as a reasonable component of their energy efficiency portfolio, even if aggregate effects are presumed to be substantial. Nevertheless, PSE does engage in a range of supportive "market transformation" activities, including: Ongoing education, tools, Energy Interval Service (15 minute interval meter data), trainings, Utility Manager to manage utility bills, networking opportunities, an online forum through Conduit, and assistance with facility audits. Continued support for market transformation should be encouraged.

- **A long-term disincentive to enable efficiency** – PSE was recently "decoupled". Decoupling means that, in the short term, its revenue and profits will not erode if it achieves efficiency uptake beyond levels specified in its Integrated Resource Plan. However, PSE may face a disincentive to invest in efficiency over the long-term; greater adoption of efficiency can erode utilities' future "rate base" – the extent of infrastructure they build and operate, reducing their total future revenues.

This study did not attempt to evaluate the extent of PSE's incentives to effect market transformation and realize absolutely all energy efficiency possible; we only note that PSE's regulations could lead to disincentives. In fact, relative to most other utilities in the USA, PSE is a leader in delivering efficiency programs and supporting broader market transformation initiatives. However, we noted a few practices which limit the uptake of efficiency, and hinder market transformation gaining momentum:

- **PSE does not provide consistent incentives** – Currently, PSE will lower incentive levels once they near their efficiency targets. This creates greater market uncertainty, and negates efforts to accelerate efficiency uptake, as the utility will decrease incentives in the future if "too much" efficiency is realized. PSE need not adjust its incentive levels; PSE's revenues were recently "decoupled" from sales, meaning that they will not lose money if efficiency (and rebates) exceeds anticipated levels.

- **Customer experience in energy programs requires continuous improvement** – Programs should provide a seamless customer experience, and program administrators should entrepreneurially seek to improve customer service. However, a number of interviewees noted that existing utility programs are difficult to navigate.

The City of Bellevue and their partners are positioned to advocate to PSE, their regulator Washington State Utilities and Transportation Commission, and State government, to ensure that PSE provides the most conducive environment for market transformation possible.

Opportunities exist for private sector clients to share RCMs

Shared RCM programming can help overcome minimum square footage requirement – RCMs must serve a portfolio of at least 1 million square feet, limiting the number of businesses that qualify for such services. However, smaller organizations can "share" an RCM by hiring one person to serve different entities to get to that square footage requirement. PSE staff report that a shared RCM offering faces unique challenges. One important issue is how much time is allocated for one customer versus someone else, and how time is charged to one customer versus another. However, if these agreements are set up appropriately, it can be successful.

Flexibility with the scale of RCM position is possible – Smaller portfolios can benefit from the program by using a part time position or incorporating RCM tasks into an existing position. The RCM can be a regular employee, or contracted, depending on the preference of the organization. In most cases the position starts out as temporary. For instance, Lake Washington School District realized $880,000 in cumulative savings via a contracted RCM.

E. Past and Current Business Engagement Programs

Governments, non-profits, and other entities in the Seattle-Bellevue region have implemented a variety of programs facilitating energy upgrades and good energy management, delivered in parallel with utility programs. Indeed, similar programs have shown promise to drive participation in energy management across the country. The following sub-sections list prominent programs that have been implemented, or may so be implemented, in the region.

SEATTLE 2030 DISTRICT

The Seattle 2030 District* is a voluntary initiative that helps building owners, tenants, and managers to strive for and meet the Challenge for Planning goals of Architecture 2030. The goals are tracked on a district level and already they are making progress as shown by the following graphic:

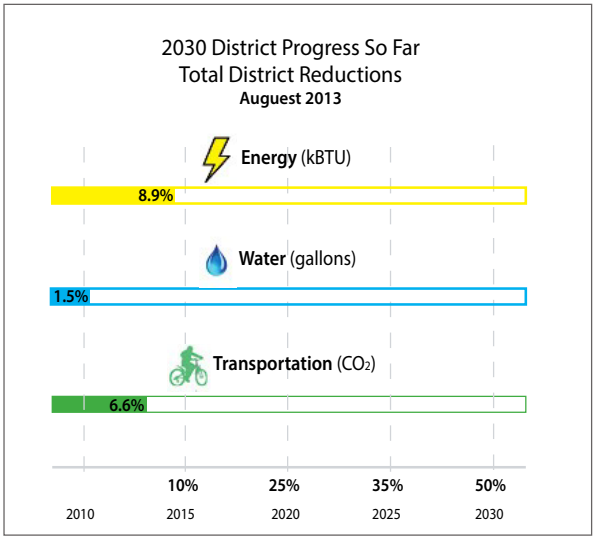

Figure 7: Seattle 2030 district's progress to district wide goals.

* Other cities, including Cleveland, Pittsburgh, and Los Angeles, are participating nationwide.

Seattle's district focuses on existing medium to large buildings that are privately owned. The Seattle 2030 District provides a road-map, partnerships, and district-wide training and tools for participants. Although the Seattle 2030 District is focused exclusively on downtown Seattle building owners, there is interest in replicating the initiative on the Eastside. Further, due to proximity, the training, expertise, and buzz of Seattle's district has started to cross-over to the Eastside.

KILOWATT CRACKDOWN

The Building Owners and Managers Association of Seattle King County, Puget Sound utilities, and NEEA's BetterBricks initiative offered the Kilowatt Crackdown from 2009-2012, as a fun and friendly way to encourage their members to participate in energy efficiency initiatives to reduce energy consumption. A total of 110 buildings participated in the 2012 Kilowatt Crackdown, totaling over 30 million square feet of office space. In 2011, 71 participants collectively saved 2.99 average megawatts of electricity and more than 51,000 therms of natural gas - enough energy to power 2,280 homes for year. Combined energy savings represents more than $1.8 million in cost reductions.

The grand prize winner and recipient of the "Kilowatt Cup" in 2012 was Bentall Kennedy, a large real estate investor and property management firm with significant presence on the Eastside. For instance, Bentall Kennedy's One Newport and the PSE Building were both noted for highest performer (small building) and most improved.

EASTSIDE SUSTAINABLE BUSINESS ALLIANCE (ESBA)

The Eastside Sustainable Business Alliance is a fusion of self-selecting Eastside businesses, of various shapes and sizes, with a shared vision of achieving more efficient operations and positive community impacts. ESBA was created by businesses themselves, but formalized and scaled up with the help of grants and City of Bellevue program management. ESBA provides a forum for education, networking, and creative brainstorming, as well as a platform for new programs that can help businesses work together, and with the community, toward a greener future.

Programs such as the Eastside Green Business Challenge motivate businesses to realize the financial case for going green while also stimulating investments in local resources and clean technology.

EASTSIDE GREEN BUSINESS CHALLENGE

The Eastside Green Business Challenge is a friendly competition among local organizations within several partnering Eastside cities. The Challenge helps participants reduce the natural resources they consume and thereby lower costs, enhance their brand, and be positive stewards of the environment. In 2012, roughly 35 businesses participated in the Challenge. Through the Challenge's online scorecard and data tracking system, these businesses alone self-reported savings (over previous year performance) of roughly $2 million and over 10,000 metric tons of carbon dioxide emissions.

The Challenge was funded in 2012 by grants from ICLEI – Local Governments for Sustainability, Office Depot, and sponsorships from other local businesses.

PRESERVATION GREEN LAB – SMALL BUSINESS PROGRAM

The Seattle-based Preservation Green Lab and the National Renewable Energy Laboratory has been awarded a $2 million grant from the US Department of Energy to develop innovative offerings for small businesses, a chronically underserved sector. The program will be offered in Washington state.

NORTHWEST BUILDING ENERGY TECHNOLOGY HUB

The economic development excelerator organization Innovate Washington is leading the development of the Northwest Building Energy Technology Hub (NBETH). Amongst other functions, NBETH will recruit buildings where new clean energy technologies and services can be deployed. In this way, NBETH will support clean energy entrepreneurship in Washington.

F. Project Financing Mechanisms for Commercial Energy Upgrades

Puget Sound Energy offers incentives and rebates for energy upgrades, which may comprise up to 70% of the cost of some energy upgrade projects. Nevertheless, buildings may require financing for the net costs of upgrades. Building owners frequently do not wish to invest their cash reserves, or limited debt capacity, on energy upgrades. For these reasons, as noted above, even buildings that actively pursue energy management opportunities will rarely pursue measures with longer than a 2-5 year payback period.

Indeed, our interviews revealed that lack of uptake of project financing is an important reason projects are not pursued. Our local interviews reflect broader, national trends: A recent survey of energy consultants suggests that 50 percent of their projects are not pursued because their clients do not have the budget capacity (Noesis Energy 2013).

Perfect financing markets require that:

- **There are no financing gaps** – Financing should be available for most project sizes, and building types.
- **There is sufficient capitalization** – Their must be a be a sufficient volume of capital available to meet the needs of the market, and enough financiers to avoid monopolistic activity.
- **Financing products are commercially attractive** – Important facets of universally attractive financing are:
  - Available at attractive rates, for longer (perhaps 7-15 years) terms.
  - Available for most customers, without overly onerous credit requirements.
  - Transferable to new owners, to meet the needs of "investment owners" who are likely to sell the building.
  - Off-balance sheet, so that owners access to debt for other projects is not limited and so that highly leveraged buildings can receive energy upgrades.
  - Able to be passed through to tenants, so that the costs of energy services are treated the same as the costs of utilities, and owners can reduce energy costs. Introducing "green real estate lease" terms can also align these incentives, but provides an extra layer of complexity and requires owners to negotiate with tenants.
  - Available to tenants of buildings aiming to undertake their own tenant-improvements.

A variety of emerging financing tools are being developed to serve the energy services market, many pioneered in the Pacific Northwest, with varying ability to meet these criteria; MIT GEDI profiles many of these tools in our forthcoming Efficiency Financing Whitepaper. Below, we profile some organizations with energy project financing tools available for commercial buildings in Bellevue.

Energy Project Financing

A number of organizations are offering energy upgrade project financing in Bellevue and the surrounding region. A few are profiled below. **This list is not intended to be exhaustive, but rather document the financing tools available in the region.**

Traditional ESCO financing – The ESCOs operating in the region facilitate financing for MUSH and owner-occupied/longer-term hold private commercial buildings. Generally, this financing is only available for larger retrofit projects.

Washington State Housing Finance Corporation – The WSHFC is investing in energy upgrade projects in a range of building types (residential

and commercial) in Washington State. Programs currently offered include:

- Clean Energy Trust program providing tax-exempt financing for non-profits. $1,000,000 is the minimum threshold to initiate the program (due to high operation cost of issuing bonds).
- Junior position in innovative Energy Service Agreement Structures with on-bill repayment (see below).

Energy Capital Solutions – ECS is a local financial services and investment firm. In partnership with MacDonald Miller and Seattle Steam, they have developed an "Efficiency Service Agreement" structure that provides energy management as an off-balance sheet service chart to buildings. The building owner repays the service fee via an on-bill repayment mechanism (currently available only in Seattle Steam territory). The repayment mechanism is structured such that ECS anticipates it can be passed to future owners. The WSHFC and the Seattle Foundation are financiers of the first projects.

Table 3: Existing Energy Upgrade Project Financing Mechanisms.

MARKET	APPROPRIATE FINANCING PRODUCTS AVAILABLE	ISSUES
Small commercial	CDFI Craft 3 offers Energy Efficiency Loans for Small Business down to $3k. TIP Capital offers lease financing down to $3k. Energy Efficiency Finance Corporation (EEFC) notes that its Efficiency Service Agreement with onbill repayment can serve buildings as small as 25k SF with Efficiency Service Agreement.	Vendor network development & education required, to promulgate financing. TIP Capital positioned to scale. Craft 3 potential to scale unclear at this time. Neither TIP Capital or Craft 3's products overcome split-incentives (without revised "green lease") or hold barriers. Customer education required.
Large commercial – Institutional & owner-occupied longer-term hold	Traditional ESCO mediated financing; Efficiency Service Agreements	ESCOs such as MacDonald Miller are successful financing owner-occupied properties where the owner does not anticipate selling. Education & promotion required.
Large commercial – tenanted properties; properties with investor-owners	Efficiency Service Agreements	Innovative mechanisms are emerging, such as Energy Capital Solutions' ESA "Retrofit Model" model, repaid on the utility bill for buildings in Seattle Steam Territory. However, an on-bill repayment options is required in Bellevue. Energy Capital Solutions is promoting adoption of on-bill repayment mechanism by PSE; municipal utility may also be an option. Education & promotion required.
Non-profit	WSHFC's Clean Energy Trust program providing tax-exempt financing for non-profits.	Aggregation to achieve sufficient project size required. $1,000,000 is the minimum threshold to initiate the program (due to high operation cost of issuing bonds). Education & promotion required.

ECS is currently working with area utilities to have similar on-bill repayment mechanisms instated. ECS anticipates being able to serve buildings as small as 25,000 square feet with this financing mechanism. While new, this and similar mechanisms have the potential to overcome many of the barriers to broadly applicable energy efficiency project financing.

TIP Capital – TIP Capital is a private equipment leasing firm. It provides equipment lease financing for a wide variety of energy upgrade equipment. TIP Capital partners with vendors, who provide their lease as an option to clients. They report serving project sizes as low to $3,000, up to multi-million dollar leases. For leases below $100,000, TIP uses an automated underwriting process, to dictate whether they will except businesses for finance, and the terms of the lease on offer. TIP thus offers a solution for financing many small business energy projects. They report that educating contractors and other vendors about the opportunity for such efficiency lease financing as a key challenge.

Conclusions

This review of the financing landscape suggests a few key conclusions:

Promising energy financing mechanisms are entering the market - Development finance organizations and private sector organizations are active in the region innovating the financing tools necessary to fund energy management projects. Financing mechanisms are being developed that appear poised to serve most building segments reasonably well.

Education about financing options is required - There is a strong need to educate building owners, managers, contractors and other vendors about the availability of these various financing mechanisms.

Need for adoption of "on-bill repayment" or other mechanisms to overcome key barriers to energy efficiency in the commercial sector - There is a need to establish payback mechanisms that can overcome the "hold barrier", "split-incentive barrier", and meet "off-balance sheet". PSE adopting an on-bill repayment mechanism akin to Seattle Steam's is one potential solution to this issue. If Washington State were to introduce legislation enabling Property Assessed Clean Energy financing districts, these issues would likewise be solved if Bellevue established such a district and enabled a financing program.

G. Workforce Development Initiatives

Professional workforce development for energy management occurs through colleges, universities, and non-profit associations in the region. Regional college-level or technical programs focused specifically on energy efficiency workforce skills are offered by Cascadia Community College, Edmonds Community College, Bellevue College, Renton Technical College, and South Seattle Community College. Appendix 7 lists a variety of credentialing programs available around the country in different professions relating to energy management; Appendix 8 reviews some workforce development programs available in the region.

Workforce development organizations are critical allies in improving the skills of building managers, operators, and service providers; increasing the caliber of energy service offerings; and growing the demand for energy efficiency services in Bellevue. The following paragraphs list important findings relating to workforce development in the region.

Career experience is paramount in the energy service field – Knowledge and experience are considered more important than credentials by interviewees in the energy service space. Internships and project-based learning can help provide some of this hands-on experience, but true proficiency comes from on-the-job training. Most if not all programs at regional colleges require student projects and internships. Even so, many of the ESCOs noted that it was difficult to find qualified candidates that have the range and depth of experience necessary to install energy conservation measures, especially directly out of school. Instead, ESCOs frequently draw skilled people from big companies with mature training system, such as Siemens, Trane, and Johnson Controls, who have invested in the training programs. However, companies are starting to invest in their own training programs as they are increasingly unable to afford the luxury of hiring senior staff directly.

Business involvement in development of training programs and curriculum is extremely important – Businesses provide essential feedback to training providers through the Workforce Education Training Board, various program advisory boards, and other avenues. Feedback from industry and workers informs policy development, system evaluation, and industry-defined skills requirements.

Delivering energy projects requires learning a diverse range of skills, from technical know-how to soft skills – Not only does the energy field require technical experts and good field engineers, it needs great team players, marketing experts, analysts, software gurus, and project managers. As a result, colleges are starting to expand their programs from a short-term credentialing programs and two-year program to four-year degrees.

Longer-term degree programs may be most appropriate to deliver appropriate skills to less experienced students – Ron Wheadon of Cascadia Community College related that they realized that they need more than 95 credits to get through the industry-developed "job title critical work functions," and the programs were very difficult to work through in just two years. Alison Pugh of Edmonds College stated that some of the students finishing short-time programs continue taking two-year program on their own budget because they feel they need a degree more than a credential. Edmonds is also partnering with Central Washington University in order to offer a management-focused track, and to meet the demand that many jobs require the four year degree.

Networks with industry must be constantly cultivated to place students with employers and internships – Community college staff noted that they must build partnerships with employers as well as potential internship sites for students. Developing such networks challenges community college programs, which often lack sufficient funding to liaise with the disaggregated energy service business community and internship sites.

Students require tuition assistance – Many programs were previously funded by American Recovery and Reinvestment Act funds, which have now been expended. Training staff note that many students do not enter degree or shorter-term certifi-

cate training programs because they lack funds. Notably, building owners and/or management firms are often hesitant to invest in energy management training for their staff; this is partly due to concerns they may leave the company and energy savings will not be realized. State workforce development professionals noted that systems such as "life long learning accounts" or other means of planning for training could be considered in the energy management sector in the future.

H. Summary & Key Conclusions

The analysis presented in this chapter suggests a number of conclusions about the market for efficiency services in Bellevue and the Seattle Metro Area, and the interventions that could improve markets for energy efficiency services.

The region is emerging as a hub of energy management services – Bellevue, as part of the broader Seattle-Bellevue-Tacoma regional economy, stands to emerge as a significant cluster of energy management expertise; the region boasts strengths in energy service firms; architectural and engineering design services; the emerging "smart buildings" sector, which leverages IT to enhance energy management practices; and sustainable property management.

Energy service providers face a significant "early deployment" hurdle – Many building owners and utilities are unaware or wary of adopting novel technologies. There is a need to support existing regional efforts (such as the Northwest Building Energy Technology Hub) to connect entrepreneurs with institutions and building owners able to serve as "living labs" for new technologies.

There are extensive opportunities to improve the quality of energy management in all building types – Larger buildings typically have quite sophisticated energy management practices. Nevertheless, most buildings in Bellevue can save a significant percentage of their energy spending by realizing a greater amount of the operational improvements and other "low-hanging fruit"; and by investing in deeper energy upgrades, with longer payback periods, which will benefit from innovative financing mechanisms.

Smaller buildings, very roughly those under 50,000 square feet, have especially limited energy management capacity – Moreover, they have less developed vendor and financier networks offering them services to improve their energy use. Innovative programs and services are needed to grow the rate of adoption of energy management in these properties.

A comprehensive suite of energy programs are available in Bellevue, higher levels of participation are warranted – The electricity and natural gas utility PSE provides a comprehensive array of efficiency programs, providing incentives for most types of energy efficiency projects. However, some programs and incentive applications need to be better streamlined. Participation rates are not nearly as high as is economically rational, from the building owners' perspective.

There is widespread industry support for Bellevue serving as educator and promoter of energy efficiency – The commercial real estate sector and the energy efficiency sector both expressed that the City of Bellevue has a role to play in facilitating knowledge of and engagement in energy management initiatives on the demand side of the energy service market, and to facilitate workforce development and entrepreneurship on the supply side of the market. These stakeholders noted the importance of programs like the Green Business Challenge, Kilowatt Crackdown, or others, to disseminate information about energy management opportunities. Some energy service providers noted that they believe the City and other regulators must play a strong role in regulating continued efficiency adoption.

A variety of innovative financing products are emerging in the region, which require support in early deployment – These financing mechanisms can address most of the barriers that keep buildings from undertaking energy management using traditional business finance sources (cash, business loans, etc.). The challenge is to educate building owners, property managers, and energy service vendors about the availability of these mechanisms, and to support early adopters in using these financing tools. Additionally, there is a need for more secure repayment mechanisms, such as on-utility-bill repayment and Property Assessed Clean Energy (PACE) financing.

A broader array of energy training opportunities for different occupations in the energy management sector, which require greater industry connections and support for student participa-

tion – A variety of workforce development programs exist to train new and existing building operators, facility managers, and energy service providers in strong energy management practices. Investing in Bellevue's human capital for energy management is likely one of the most effective ways that energy management can be improved in buildings. However, only a small percent of the building operators and managers who would benefit from these trainings have participated. There is need to provide greater promotions for programs; scholarships and life-long learning opportunities for students; and connections with area businesses, to provide internships and career pathways.

III. Market Transformation Recommendations

This section outlines actions the City of Bellevue and selective partners can take to stimulate the energy service sector, by:

- Increasing the uptake and quality of energy management practices in commercial real estate.
- Increasing local demand for energy management services.
- Enhancing workforce capacity to implement energy management, providing valuable skills to existing and new energy management workers.
- Supporting business capacity to serve this space.

A. Lead by Example in City Buildings

In Bellevue, City operations make up a small percentage of the total energy used in the community—only about 1.3%. However, municipal buildings are often the first place to start working on energy efficiency because government buildings tend to have longer periods of ownership, have dedicated facility managers, and can kick-start demand for services by being "early adopters" of technology. Furthermore, Bellevue's municipal buildings comprised 53% of all City energy use. The following strategies should be initiated as a component of Bellevue's energy efficiency market transformation strategy.

Undertake and share experiences with deeper energy upgrades and novel technologies community-wide – Bellevue's Facility Services Division continues to successfully demonstrate that energy conservation is possible and that it has a financial payback. For example, City Hall has cost-effectively improved its ENERGY STAR score from 91 to 98 over the past five years, which translates into a 34.1% adjusted annual energy savings. Most of the energy conservation measures implemented have a 5-10 year payback; operational savings alone have saved $350,000 cumulatively during the first 3 years. The City will continue to share these successes via press releases, Bellevue TV, local publications such as the BOC Bulletin, and other forums. However, Bellevue could go much further with testing technologies (e.g. through NBETH), publicizing success, and learning from deployment.

Establish an internal revolving fund to build upon past successes – The City should adopt an internal revolving fund to finance energy efficiency projects. The fund could be capitalized with a portion of realized energy savings from past efficiency projects. This is a practice that has been implemented by many leading local governments and institutions, including the City of Ann Arbor, Dupont, and MIT.

Lead by example with building data disclosure – The City should be transparent with its own building data. To date, more than 50 municipal buildings have been entered into Portfolio Manager, even though the vast majority of them do not qualify for the ENERGY STAR certification due to the building type. Although Bellevue shares building information readily with the public on request, disclosing energy use via a formal report is an important step if asking commercial business owners to take this step (see example of Seattle Municipal Buildings 2011-2012 Energy Performance Report).

Directly support job creation and entrepreneurship through procurement of energy services – Bellevue has participated in two energy service performance contracts over the last two years. Procurement of energy services directly supports regional jobs. In the first quarter of reporting for 2013, 4.19 energy efficiency FTEs were supported from one of the City's energy service contracts. The City should continue to procure and implement all cost-effective energy efficiency measures at its own facilities.

Bellevue has also procured a public dashboard with a local start-up firm to monitor and report on greenhouse gas emissions and environmental performance. In this case, the City is leading by example by reporting and monitoring its performance. It is also supporting local entrepreneurial firms by procuring their services, a tactic considered by the NW Energy Angels' Eric Berman to be a helpful "demand-side" activity of the city.

B. Set community-wide targets

Many of the successful business engagement programs and initiatives such as Seattle's 2030 District (50% by 2030), Envision Charlotte (20%), and PSE's Resource Conservation Manager program (13%) have clear, measurable energy reduction targets as a cornerstone of their program. Darrell Smith, Director of Facilities and Energy at Microsoft, responded in an interview that a clear role for government to support growth in this sector is by "setting goals and targets."

The City of Bellevue adopted the Mayor's Climate Protection Agreement in 2007 to reduce emissions 7% below 1990 levels by 2012. Though Bellevue has achieved significant reductions in municipal emissions since signing the MCPA, it did not reach the stated target like many cities. Notwithstanding the fact, the MCPA set hundreds of cities on the path to reducing emissions and avoiding emissions that would have otherwise been much greater, especially as population increases. Regional efforts to establish countywide greenhouse gas reduction targets are currently in the work. Seattle has set a target for carbon neutrality by 2050. Other regional targets include:

- State of Washington: 50% reduction from 1990 levels by 2050
- King County: 80% reduction from 2007 levels by 2050
- City of Issaquah: 80% reduction from 2007 levels by 2050

Set community-wide greenhouse gas emission targets which demonstrate a commitment to leadership, stewardship, and innovation – Bellevue is in the position of deciding what target to implement in coming years. Any one jurisdiction or entity is but one player among millions – a necessary but insufficient force to get the job done alone. So, it is not precision, but action and leadership in the right direction, in the face of unavoidable uncertainties, that is key.

C. Expand businesses engagement programs

The City of Bellevue played the leading role in establishing the Eastside Sustainable Business Alliance (ESBA), serving the C-7 New Energy Partnership cities. Notably, ESBA hosted a Green Business Challenge in 2012, which engaged local businesses and helped regional businesses achieve $1.9 million in annual energy savings. While ESBA continues to provide how-to online resources and a "Sustainable Business Scorecard," ESBA requires ongoing staffing and program development to realize the value of these resources and capitalize on its early successes. The key challenge, and opportunity, facing ESBA is enhancing its reach and the quality of its programming. The subsections below outline opportunities to realize these priorities.

The City's past history with the Green Business Challenge provides the continued opportunity to engage properties in different programs aimed at enhancing their energy management capacity. Below, we outline important priorities for future business engagement programming, including considerations for delivering outreach as well as the nature of technical assistance to be offered to businesses. Appendix 9 features key considerations for program implementation.

Bellevue should lead in the development of programming for its downtown core. However, it should coordinate its program design with other C7 cities and other stakeholders, to achieve economies of scale. The programs could potentially be delivered across the Eastside.

Business engagement programming should take place (and has) before mandatory policies requiring improved energy management practices (see section III-D below).

PROGRAM OUTREACH AND RECRUITMENT CONSIDERATIONS

Aim for broad participation. Make benchmarking energy use the sole requirement for new business engagement programs – MIT GEDI believes that an EE program is likely to achieve the greatest energy savings, and associated economic development benefits, from cultivating a broad membership, covering much of the commercial floorspace in Bellevue as possible. Thus, participation should only require the simple action of benchmarking performance, which will subsequently inform and drive energy management actions.

Conduct outreach via multiple preexisting channels – New programming should be intensely marketed for at least a 2-3 month period leading up to the program launch. Other outreach practices may occur over a longer time period, including:

- Bellevue mayor and/or council could publicly promote the program.
- Solicit building owners and managers directly, via contacts in real estate databases (CoStar, etc.)
- Liaising with regional real estate organizations.
- Providing communications via City mailings.
- Promote via the City Economic Development Office's business liaison programs.

Focus especially on engaging properties' financial decision-makers - Numerous interviewees noted the importance of engaging buildings' financial decision-makers as key to realizing adoption of deep energy management opportunities. However, getting senior decision-makers' active involvement is difficult, given the multiple constraints on their time. Their engagement will likely require greater promotions from Bellevue's mayor and council, as well as high quality technical assistance.

Promote participants' successes – Successes can be celebrated with public promotion via signage, awards, websites, press releases, and other means to publicize projects that incorporate strong energy efficiency measures.

PROGRAM TECHNICAL ASSISTANCE STRATEGIES

Provide participants with energy use information feedback – Real-time data on energy use highlights

that energy use has a cost; provides a feedback loop to key actors; and fosters collaborative learning about energy use. The concept can be expanded to other resources including water, solid waste, or storm water as desired.

Establish buildings analytics-based tools to assess energy efficiency potential – A variety of technologies are increasingly available that allow for remote assessments of buildings' energy efficiency potential, based off of input of information regarding buildings' characteristics and/or building energy use interval data. These services have potential to add valuable services to local energy challenges; for instance, Seattle 2030 District is implementing buildings analytics solutions for 15 of its members (S2030D 2013).

Provide the opportunity to develop "Deep Energy Retrofit Gameplan" – The Seattle 2030 District has faced the challenge of only a limited number of buildings electing to undertake deep energy upgrades; buildings will pick the low-hanging fruit, but rarely venture further up the ladder. Indeed, opportunities for deep energy upgrades typically only occur for buildings at key junctures in their lifecycle – for instance, a change of ownership, re-financing, re-tenanting, or renovations (PDC 2013). Bellevue can introduce a Deep Energy Retrofit Gameplan service, which will work with building owners to identify the timing, financing, and preliminary design considerations for future deep energy upgrades. The City of Bellevue should consider using the Gameplan service in its own buildings, to test and refine the new service.

Facilitate property manager and building operator training – A number of continuing education programs exist in the region for property managers and building operators to build their skills with strong sustainability/energy management. However, participation in these continuing education programs is low, relative to the number of building operators and managers active in the area. City staff should take the lead in liaising with utilities and the state workforce development system to identify opportunities for co-funding existing worker retraining in energy management. ESBA and other partners can encourage building owners to co-sponsor this training.

Assess the need & develop an "Energy Management Bootcamp" for senior financial decision makers – In conjunction with other partners such as Bellevue College and ESBA, conduct focus groups to assess the need for an Energy Management Bootcamp for financial decision-makers. The Bootcamp would outline the importance of strong ongoing operations management, as well as introduce decision-makers to energy upgrade financing tools.

Facilitate internships for area energy management students – Many of the regions' energy/sustainability management programs encourage their students to undertake summer internships conducting energy management projects. ESBA should broker relationships between larger participants and community college internship coordination staff. Additionally, ESBA could consider hosting an internship serving small properties, perhaps providing turnkey upgrades for a limited range of technologies commonly found in Bellevue's building stock. Area ESCOs, utility direct install personnel, and/or Preservation Green Lab could potentially supervise this position.

Recruit buildings to participate in NBETH and/or other technology demonstration initiatives – NBETH is being established to test, experiment, and demonstrate innovative energy technologies in new properties. In addition to serving as a "Living Lab" in City facilities, the City should work with NBETH to identify properties in its ESBA network that can serve as deployment sites for new technologies.

Aggregate small businesses – ESBA and the City should partner to recruit small buildings into PSE's direct installation programs en mass. Additionally, it should issue an RFI to energy service providers, asking that they identify building typologies which they could serve with more holistic energy upgrades if ESBA were able to aggregate sufficient numbers. The RFI should include exploration of the financing models applicable to these building types, and how potential partner development finance intermediaries (such as the Washington State Housing Finance Commission or local CDFIs) could provide credit enhancements for energy equipment financing.

D. Enact policies that drive energy investments

Cities and states around the USA are increasingly adopting mandatory policies that drive cost-effective energy improvements in existing buildings. Such policies can be categorized as follows:

- **Energy use benchmarking and disclosure policies –** Such policies require that commercial buildings above a certain size threshold annually report their energy use to their local/state government. This information may be disclosed publicly. Such policies are intended to increase market transparency, allowing prospective occupants to better understand energy prices and making building owners more aware of their buildings' performance relative to other buildings. Cities that have adopted benchmarking and disclosure policies to date include Washington, DC, Austin, New York City, Seattle, San Francisco, Philadelphia, Boston, Minneapolis, and Chicago.

- **Energy assessment policies –** Some local governments have adopted policies that require buildings to undergo an assessment of energy savings opportunities. Such assessments could include an ASHRAE audit or a retro-commissioning study. Assessments may be required either by some date, or at some point in the buildings' life cycle (re-tenanting, re-sale, etc.). Austin, New York, and San Francisco, and Boston all require commercial buildings to undergo assessments of energy efficiency potential.

- **Mandatory energy improvements to existing buildings –** Cities are increasingly considering mandating energy savings measures in existing buildings. These regulations may be achieved by requiring that buildings meet certain energy code provisions by some point, or that they implement energy assessment recommendations meeting some cost-efficacy criteria. New York and San Francisco have adopted such policies.

We recommend that the City of Bellevue adopt a benchmarking and disclosure policy. Adopting the policy will increase transparency in energy use and provide owners with greater understanding of their buildings' performance and energy potential; both these effects support more perfect information, a key requirement for proper market functioning.

Based on Seattle's experience, **we recommend starting a voluntary challenge and data sharing prior to implementing mandatory legislation.** This allows property owners to get comfortable with data sharing and provides champions for passing legislation. Furthermore, starting with a voluntary program allows energy conservation and efficiency efforts to continue while benchmarking requirements are phased in.

The following section outlines key considerations for an ordinance enacting the policy. Bellevue should anticipate needing a period of two years after passage of the ordinance to ensure that the City and stakeholders are prepared for the first reporting deadline. MIT GEDI provides draft ordinance language in Appendix 10, reflecting these principles. Appendix 11 includes considerations for developing the policy in conjunction with various stakeholders.

KEY PRINCIPLES OF ORDINANCE

Region-wide consistency - Have policy in Bellevue mirror regional benchmarking policies to minimize burden for building owners. Align with Seattle around building size, technical assistance, and reporting platform when possible. Communication and coordination with the City of Seattle should take place whenever possible, particularly with regard to developing a reporting platform.

Minimum building size threshold - The minimum commercial building size threshold for covered buildings should be set at 25,000 SF based on conversations with the city government and stakeholders.

Benchmarking public buildings - Government-

owned buildings should be benchmarked first to demonstrate that the City of Bellevue is leading by example. Benchmarking public buildings increases the ability of local governments to manage and reduce taxpayer-funded energy costs.

Multi-year implementation strategy - A multi-year implementation schedule should be established based on a building's gross floor area or number of dwelling units. We recommend starting with commercial buildings, prior to including MF properties. The policy should be structured to affect the largest nonresidential buildings in a given area first, while extending the initial compliance period by an additional year for smaller nonresidential buildings and multifamily buildings. This phased approach makes implementation activities more manageable for the government and gives the market ample time to comply with policy requirements.

Reporting benchmarking information - Require annual reporting of benchmarking information to the state or local government, enabling policymakers to track compliance, measure data quality, evaluate policy impacts, and leverage building energy performance metrics to inform the development of new policies and incentives.

Align public disclosure with Seattle - Aim to annually publish benchmarking information on a publicly accessible web site. Establish a multi-year publication schedule beginning with government facilities, followed by privately owned buildings. Public disclosure increases public awareness and puts political pressure on buildings to comply. Some existing policies, including that of Seattle, reference a different disclosure model known as transactional disclosure, whereby the building owner must release benchmarking information to prospective counterparties in a building financial transaction, such as a lease, sale or financing. In order to provide consistency in the market, Council should pass a resolution committing to public disclosure if/when Seattle does, and adopting any asset-based assessment requirements (potentially with 1-2 year lag).

Whole-building energy consumption data access - Puget Sound Energy already has a system in place to facilitate their customers who benchmark. PSE aggregates meter data for multifamily buildings and multi-tenant commercial buildings with four or more tenants. This allows multi-tenant buildings to benchmark by providing whole-building data. With PSE's updated system, owners or managers can provide either meter numbers or building addresses when requesting aggregated data.

Inability to benchmark - Establish proxy or default values for use by building owners in benchmarking, to be used in cases where the owner is unable to benchmark due to a failure by tenants to provide energy consumption or space use information.

Enforcement - The implementing agency must have the authority to enforce noncompliance in the annual reporting of benchmarking information to the Bellevue government. The recommended penalties are a fine of $150 with continued failure resulting in additional fines of $500 each quarter for buildings 25,000 to 49,999 SF, or $1,000 for buildings 50,000 SF or greater. These fines were based off of the Seattle ordinance.

Require periodic third-party verification of benchmarking data - Data to be verified could be chosen randomly. This will better ensure integrity of reported data.

How do benchmarking and disclosure policies improve energy management? *Benchmarking and public disclosure of energy use can foster better energy management in a number of ways: Owners and managers better understand how their buildings relative to peers; prospective tenants better understand energy cost; and energy services can be better targeted at energy intensive facilities. Indeed, buildings benchmarked with Energy Star Portfolio Manager achieved a 7 percent reduction in energy use between 2008 to 2011. The US cities that have implemented benchmarking and disclosure policies have greatly increased the percentage of buildings benchmarking their properties, and learned important lessons from the data collected. Cities that provide training and assistance with benchmarking have achieved greater compliance, and more support from the real estate sector.*

E. Support innovative project financing mechanisms

Traditional business financing tools (cash reserves, business loans, etc.) are often unsuitable to building energy upgrade projects. However, as documented in Section II-F, workable energy project financing mechanisms are increasingly available within the region; what is more, development finance organizations like WSHFC and enterprising financial services firms are refining these offerings. In this context, the City should:

Educate businesses about different financing mechanisms – As described in Section III-C, as part of its business engagement, the City and its partners can facilitate seminars, individual advising, and take other opportunities to educate more building owners and property managers about financing options available in Bellevue. Additionally, Bellevue should ensure that resources noting all available financing mechanisms are provided on the City's website, and in other media.

Encourage PSE to adopt "on-bill repayment" mechanisms, and/or other facilitate other novel repayment options – As noted in Section II-E, novel financing mechanisms with on-utility-bill repayment have been introduced in Seattle Steam's territory. Such on-bill efficiency service agreements overcome many of the previously intractable barriers to energy project finance. The City should work with local stakeholders to encourage PSE to adopt such on-bill repayment options. Alternately, it may consider adopting on-bill repayment for energy projects via City utilities (water, etc.). Lastly, the City should support PACE financing enabling legislation, if and when it is considered at the State level, and should quickly adopt a PACE financing district once legislation is implemented.

F. Support entrepreneurship in the energy sector

The City of Bellevue and the broader Seattle-Bellevue region feature strong energy-related business clusters, research and development infrastructure, venture capital, and other resources for entrepreneurs. Bellevue can build from these resources to ensure lasting competitiveness in the region's energy sector, and support the export of energy-related products, services, and expertise. The key to activating this potential is to build a broad local and regional network, coordinate the various public and private business assistance assets, and to bridge the resources with existing and promising entrepreneurs.

Support energy efficiency startups and entrepreneurship with the City's existing economic development resources - Promoting entrepreneurship and startups in the energy efficiency sector is well aligned with the City's vision and agendas in economic development, environmental protection, and community betterment. The City's Office of Economic Development (OED) focuses on facilitating local business development based on its public and private network and resources. OED's business promotion strategies focus on connecting local entrepreneurs with financial and technical assistance resources offered by its local, regional, and national business organization partners. Major financial and technical support resources include:

- **State tax incentive** – Washington State High Technology Sales/Use Tax Deferral (state)
- **Loans provided by nonconventional lenders** – Washington CASH (state), Evergreen Business Capital Program (northwest), Community Capital Development (Seattle), Small Business Administration (federal)
- **Technical assistance for small businesses and entrepreneurs** – Bellevue Entrepreneur Center (local), Bellevue Entrepreneur Network (local), Washington Small Business Development Center (state),The Washington Business Center (state), NW Entrepreneur Network (northwest), Small Business Administration (federal)

Although these financial, technical and network resources foster an environment that is favorable to entrepreneurs, none are specifically geared toward energy efficiency-related industries. Efforts should be taken to proactively align energy efficiency entrepreneurs and businesses with these resources.

Work wih economic development organizations to develop economic development strategies focused on the energy efficiency sector – The City should engage with partners such as the Bellevue Entrepreneur Center, Bellevue Entrepreneur Network and the proposed Bellevue Center for Applied Sustainability on the following strategies:

- Explore creating an energy efficiency or clean tech group within the Bellevue Entrepreneur Network to foster peer learning and support among firms and facilitate communication to firms about business development resources and from firms around emerging issues and opportunities.
- Align policies and proposals to support energy efficiency demand and business development within the City's Comprehensive Plan update with the City Council Economic Development Strategic Planning's vision of economic future.
- Brand Bellevue and the region as delivering the economic potential and environmental value of advanced energy efficiency buildings, technology R&D and entrepreneurship.
- Recruit energy efficiency business professionals and technology experts into the technical assistance, training, and mentoring programs for local businesses across all industries.
- Create an on-going training or knowledge development effort to keep business technical assistance providers up to speed on evolving EE technologies, tools, methods and referral options.

- Package information of entrepreneurship and startup supporting resources that apply to energy efficiency industries.

Coordinate with regional stakeholders to help green design and engineering firms grow the out-of-region market - Bellevue could collaborate with stakeholders in the Metro Seattle region's green building design and engineering fields to develop industry promotion strategies to help grow the "export" market for local and regional firms. The key stakeholders include:

- (proposed) Bellevue Center for Applied Sustainability.
- Local and regional green building architecture and engineering firms.
- Bellevue College, Department of Interior Design.
- University of Washington, Washington State University, architecture departments & programs.
- AIA Seattle Chapter.
- The Cascadia Green Building Council.
- Seattle Office of Economic Development.
- Washington State Department of Commerce.
- Economic Development Council of Seattle and King County.
- Prosperity Partnership.
- Greater Seattle Chamber of Commerce.
- King County Green Tools.

The stakeholder group should coordinate in:

- Conducting green building industry research to evaluate the capacity and opportunities with import substitution and export, identify products and services that have major export potentials, analyze regulation, financial, workforce and market barriers. The research should be based on interviews with leading professional and technical service firms, in particular architects, engineers and developers with green building expertise.
- Developing strategies to promote market expansion and export in the focused products and services area, an example is Portland's "We Build Green Cities."
- Maintaining a long-term network to facilitate the communication among green building stakeholders, which should channel market feedback to universities and community colleges, help firms implement new technologies and recruit graduates with green building expertise.
- Organizing an annual conference and expo on advanced energy efficiency technology and green building design. This conference would have dual purposes: (1) advance knowledge and dissemination of best practices and emerging technologies in building energy efficiency; and (2) strengthen recognition of the Seattle region as a leading center of green building and EE technology along with fostering knowledge and business development opportunities for area firms.

> ***Example:*** *Portland "We Build Green Cities" program aims to leverage Portland and Oregon's strength in sustainability-related industries, promote the export of services and products around five areas: energy, water, transportation, green build, waste recycle, investment and financing, ecosystem services. The program website provides a searchable (by business area and sector category) database of local firms with export capacities in these areas. The program is led by EcoDistricts (previously Portland Sustainability Institute) in partnership with Business Oregon, the City of Portland and the Portland Development Commission.*

G. Invest in workforce and professional development in the region

Throughout the region, a variety of workforce development programs provide training in energy management techniques, and pathways into energy management-related careers. These programs have the capacity to add more students. The impact of investing in the energy management skills of these various positions could be substantial; interviews and calculations suggest that the large majority of building operators and managers have not received formal energy management training and could benefit significantly from such education opportunities.

However, the regions' workforce development programs face the challenge of recruiting participants at a time when building owners and management firms are reluctant to invest in their staff. Additionally, they face the challenge of connecting their students with internships and career opportunities with real estate and energy service firms in the region.

Bellevue can address these barriers by liaising between community colleges and other entities offering energy management training; the local real estate market; and the state workforce development system. The City can best fulfill this role by establishing the Bellevue Center for Applied Sustainability, in partnership with Bellevue College and other regional community colleges such as Cascadia and Edmonds.

ESTABLISH A BELLEVUE CENTER FOR APPLIED SUSTAINABILITY

The BCAS would serve as a 'center of gravity' for sustainability practices – a place where students, businesses, residents, and government can connect to implement sustainability projects, grow careers in sustainability, and test new technologies and services. The Center can serve as a matchmaker, helping to facilitate the following types of connections:

- Provide students better access to the business community for work-study training in the field of sustainable business practices, or more specific industry concentrations. Benefits are received by both students and businesses. Points of contact to make this happen would be ESBA, BC students, and the BC career development/internship office.
- Provide students opportunity to manage day to day operations of business and community engagement programs (GreenWA, ESBA), giving them working-world skills in project management, communications, and sustainability topics while reducing management burden by paid City/College staff. Points of contact to make this happen would be ESBA/GreenWA managers, BC students, and BC Office of Sustainability.
- Sharing of best practices by local business leaders, through open forums, with students, other businesses, and the community. This helps in moving the conversation forward and educating/orienting students who are developing new careers (thereby helping to create the business leaders of tomorrow).
- Helping students learn how make the business case for sustainability investments.
- Optimizing the use of technologies and other innovations across more business and community applications.

EXPLORE OPPORTUNITIES TO ESTABLISH SCHOLARSHIPS AND/OR "LIFE-LONG LEARNING ACCOUNTS" IN ENERGY MANAGEMENT PROFESSIONS

Building owners and management firms stand to benefit from sponsoring their employees' training in energy management. However, in the current economic climate, they are hesitant to invest in these skills.

The City, BCAS, and other partners can explore opportunities to establish matching scholarships

and/or "lifelong learning accounts" to provide professional development in energy management training. The City should:

- Promote existing training programs (such as the BOC to building owners, managers, and operators.
- Liaise with utilities, NEEA, the State Workforce Education Coordinating Board, and foundations, to develop energy management training scholarships.

ENCOURAGE PSE TO BROADEN TRAINING RESOURCES

PSE's quarterly training on energy management topics (offered primarily for RCMs) could also be opened up to include others, who may or may not be an official RCM within their organization in order to expand the knowledge base and provide peer-to-peer and cohort learning opportunities.

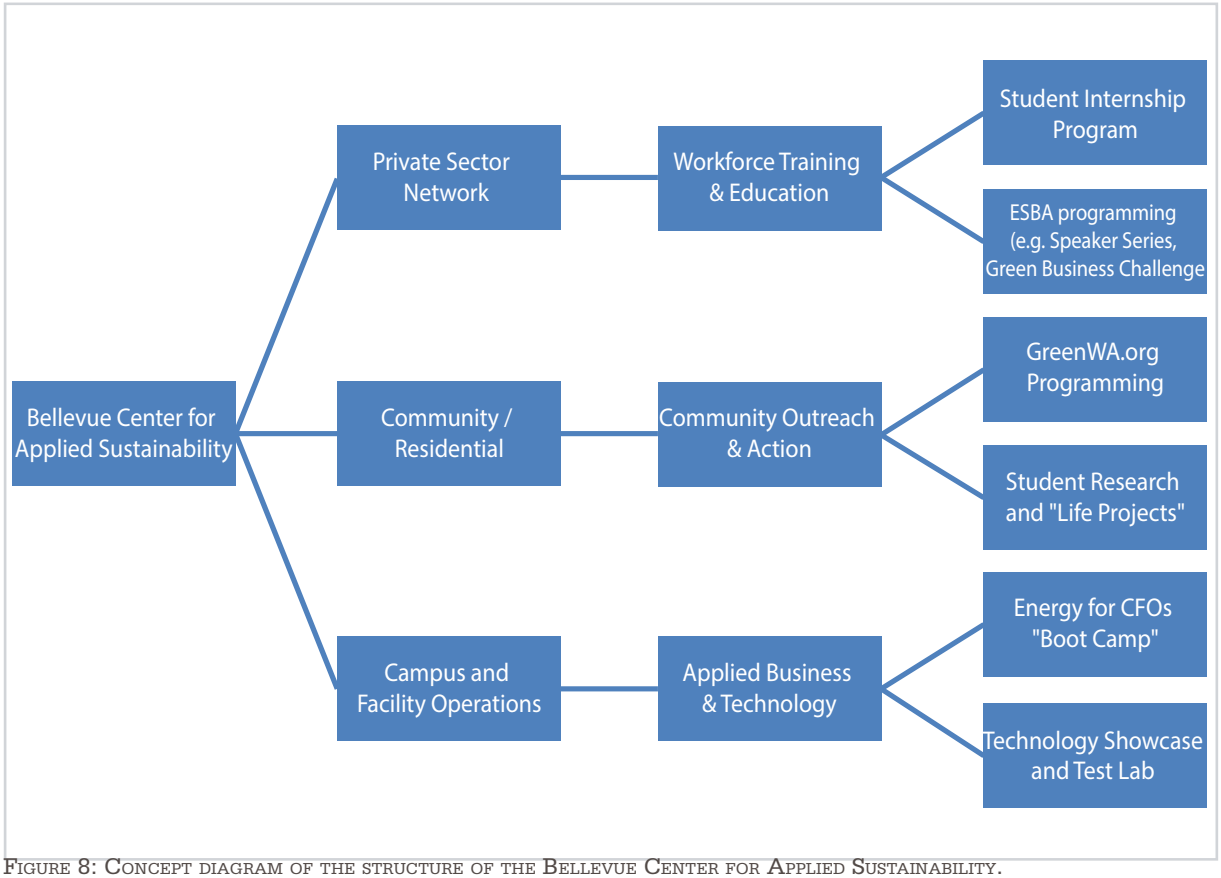

FIGURE 8: CONCEPT DIAGRAM OF THE STRUCTURE OF THE BELLEVUE CENTER FOR APPLIED SUSTAINABILITY.

IV. Conclusion

As noted in Section I of this report, there is a compelling economic case to support stronger energy management practices in existing commercial and industrial buildings. Such efforts will stimulate job growth, enhance businesses' profitability, realize healthier buildings, develop local economic clusters, and reduce buildings' environmental impacts. This research suggests that the City of Bellevue can support stronger energy management amongst its commercial building stock in a variety of ways, including leading by example; continuing to set strong community-wide targets; proactively engaging businesses and promoting energy programs; adopting a benchmarking and disclosure policy for private commercial buildings; supporting innovative project financing mechanisms; and supporting business and workforce development in the energy management space. Taking these actions will position Bellevue as a national leader in energy market transformation, and contribute to a more prosperous economy and greener community.

V. Works Cited

Belzer, D.B. Energy Efficiency Potential in Existing Commercial Buildings: A Review of Select Recent Studies. Pacific Northwest National Laboratory, 2009.

BusinessWire. The Market for Energy Efficiency Retrofits in Commercial Buildings Will Nearly Double by 2020, Reaching $152 Billion Worldwide, According to Pike Research. 2012. http://www.businesswire.com/news/home/20120709005497/en/Market-Energy-Efficiency-Retrofits-Commercial-Buildings-Double.

CleanEdge. "2013 U.S. Clean Tech Leadership Index: State & Metro." 2013.

EON. Operational Improvements Can Double Energy Efficiency Savings in Commercial Buildings: Data from FirstFuel Software Shows Half of Energy Savings Reside in Low/No-Cost Operational Changes; Represents $17 Billion Savings Opportunity. 2 13, 2013. http://eon.businesswire.com/news/eon/20130206005560/en/FirstFuel/Energy-Efficiency/Operational-Improvements.

Groom Energy. The 2013 Enterprise Smart Grid: Corporate Buyers Guide for Energy Management Software. Groom Energy, 2013.

Hardcastle, Alan, interview by Emma Johnson and Brendan McEwen. Senior Research Associate (6 4, 2013).

McKinsey & Co. "Unlocking energ efficiency in the US economy." 2009.

Microsoft. 88 acres: How Microsoft Quietly Built the City of the Future. 2013. http://www.microsoft.com/en-us/news/stories/88acres/88-acres-how-microsoft-quietly-built-the-city-of-the-future-chapter-3.aspx (accessed 7 24, 2013).

Mills, Evan. Commissioning: Capturing the Potential. ASHRAE Journal, 2011.

National Institute of Building Sciences. Life-Cycle Cost Analysis. 06 28, 2010. http://www.wbdg.org/resources/lcca.php (accessed 09 1, 2013).

NTHP PGL. Realizing the Energy Efficiency Potential of Small Buildings. Seattle: National Trust for Historic Preservation - Preservation Green Lab, 2013.

PDC. Retrofit PDX: A Strategy for Buildings, Energy, and Portland's Economic Growth. JDM Associates, Portland Development Commission, 2013.

Porter, M.E. Competitive Strategy: Techniques for Analyzing Industries and Competitors. New York: Free Press, 1980.

PSE. Planning for the Future: Integrated Resource Plan. May 31, 2013. http://pse.com/aboutpse/EnergySupply/Pages/Resource-Planning.aspx (accessed July 25, 2013).

RMI. Category expenses by building type for commercial sector. 2013. http://www.rmi.org/RFGraph-commercial_building_category_expenses (accessed 09 3, 2013).

—. Rocky Mountain Institute . 2013. http://www.rmi.org/retrofit_depot (accessed 08 25, 2013).

S2030D. District Partners with Switch Automation. 2013. http://www.2030district.org/seattle/district-member-resources (accessed 8 12, 2013).

Satchwell, Andrew, Charles Goldman, Peter Larsen, Donald Gilligan, and Terry Singer. A Survey of the U.S. ESCO Industry: Market Growth and Development from 2008 to 2011. Berkeley: Lawrence Berkeley National Labortatory, Environmental Energy Technologies Division, 2010.

Satchwell, Andrew, Charles Goldman, Peter Larsen, Donald Gilligan, and Terry Singer. A Survey of the U.S. ESCO Industry: Market Growth and Development from 2008 to 2011. Lawrence Berkeley National Laboraor and the National Association of Energy Service Companies, 2010.

WSESD. Green-Economy Jobs Report. Washington State Employment Security Department, 2011

Appendix 1 - Literature Review of the Economic Impacts of Energy Efficiency

CITATION (AUTHOR, DATE, TITLE)	REGION	KEY FINDINGS
ACEEE, 2012, *Energy Efficiency and Economic Opportunity*	USA	In 2010, the ACEEE estimated at least 830,000 jobs related to resource and energy efficiency in the U.S. The direct jobs created as a result of pursuing energy efficiency projects are local since they often involve installing or maintaining equipment locally. Meanwhile jobs in the energy utility sector are often related to transporting or procuring fuel out of state.
Andrew C. Burr, Cliff Majersik, Sarah Stellberg, Institute for Market Transformation, Heidi Garrett-Peltier, Political Economy Research Institute, 2012, *Analysis of Job Creation and Energy Cost Savings From Building Energy Rating and Disclosure Policy*	USA	In 2012, the Institute for Market Transformation (IMT) analyzed the impact a national benchmarking and disclosure policy would have on job creation. Their study predicted that such a policy would create 59,620 net new jobs across the country by the year 2020. The estimated total energy savings reached over $18 billion in 12 years.
Charles Goldman, Merrian C. Fuller and Elizabeth Stuart, Jane S. Peters, Marjorie McRae, Nathaniel Albers, Susan Lutzenhiser and Mersiha Spahic, 2010, *Energy Efficiency Services Sector: Workforce Size and Expectations for Growth*	USA	The Lawrence Berkeley National Laboratory's 2010 study evaluated the size of the "energy efficiency services sector" (e.g. investment related jobs). It estimates the sector comprised of 114,000 Person-Years-of-Employment (PYE) in 2008, which they translate to being approximately equal to 380,000 individuals.
Heidi Garrett-Peltier, 2011, *Employment Estimates for Energy Efficiency Retrofits of Commercial Buildings*	USA	A study of the effects of a national program promoting building retrofits to increase their energy performance found that for every $1 million saved by USA real estate, 6.5 direct PYEs and 4.0 induced PYEs.
Mark Muro, Jonathan Rothwell, and Devashree Saha with Battelle Technology Partnership Practice, 2011, *Sizing the Clean Econoy: A National and Regional Green Jobs Assessment*	USA – metropolitan focus	The majority of the U.S.'s clean economy jobs and the most growth in this sector have historically been concentrated in large metropolitan areas. From 2003 to 2010, 75 percent of clean economy jobs and 64 percent of all jobs in 2011 were located in the 100 largest metropolitan areas in the United States. The clean economy is estimated to employ 2.7 million workers with jobs spread across industries in manufacturing, transit, renewable resources, and more.
Hendricks, Bracken and Jorge Madrid. 2011. *A Star Turn for Energy Efficiency Jobs.* Center for American Progress.	USA – regional focus	Energy efficiency improvements have the benefits of import substitution in regional economies. The majority of energy efficiency products are over 90% U.S. made, including components for heating, ventilation, and air conditioning (HVAC) systems. Comparatively, the domestic share of production for other products in the U.S. is around 76 percent.

CITATION (AUTHOR, DATE, TITLE)	REGION	KEY FINDINGS
Environment Northeast, 2012, *Energy Efficiency: Engine of Economic Growth in Eastern Canada*	Eastern Canada	A study of the macroeconomic effects of energy efficiency in the provinces of Québec, New Brunswick, Nova Scotia, and Prince Edward Island. Even in the more conservative investment scenario, it was found that, over 15 years, energy benefits would exceed participant and efficiency programs costs by $40 billion, in terms of net present value. This would then drive job creation.
Jamie Howland & Derek Murrow, ENE Lisa Petraglia & Tyler Comings, Economic Development Research Group, Inc., 2009, *Energy Efficiency: Engine of Economic Growth*	New England	A study of energy efficiency investments in New England, found that efficiency investments pay for themselves over a fairly short period of time in terms of increased economic activity and job creation. Over 15 years, the increase in employment due to spending on electricity efficiency investments would equal 767,011 PYEs. Annually, this would equal a maximum increase of 43,193 PYEs.
Richard Sedano, Catherine Murray, Economic and Environmental Impact Modeling by Synapse Energy Economics, Inc., William R. Steinhurst, Ph.D., 2005, *Electric Energy Efficiency and Renewable Energy in New England*	New England	An early study done in 2005 examined the impact of energy efficiency programs in New England and found that for every $1 million spent on energy efficiency, 1.77 direct PYEs would be created, but 2.61 induced PYEs would be created. Over ten years, these programs were expected to create a total of 15,533 direct, indirect, and induced jobs.
Claudio Martinez, Jeff Deyette, Sandra Sattler, Anee McKibbin, 2011, *A Bright Future for the Heartland: Powering the Midwest Economy with Clean Energy*	Midwest	When the Midwest Governors Association passed policies promoting energy efficiency and renewable energy, the Union of Concerned Scientists completed a 2011 study estimating that 85,000 net jobs would be created by 2030 over baseline projections.
Hewlett Foundation Energy Series, 2002, *The New Mother Lode: The Potential for More Efficient Electricity Use in the Southwest*	Southwest	In the Southwest, the electric utility industry only supports 4 to 5 jobs per $1 million spent, while sectors like the construction, services, and retail sectors support between 11 and 33 jobs per $1 million spent. This study evaluated the impact of adopting a range of energy efficiency policies in the region. It found that 58,000 net jobs would be added to the region as a result of these policies.
Lisa Petraglia, Tyler Comings, and Glen Weisbrod, Economic Development Research Group, Inc., 2010, *State of Wisconsin Public Service Commission of Wisconsin, Focus on Energy Evaluation, Economic Development Benefits: CY09 Economic Benefits*	Wisconsin	This study evaluated the impacts of Wisconsin's Focus on Energy Conservation Program. It calculated the program engendered 5100 job-years, annually.
Rick Hornby, David White, Tommy Vitolo, Tyler Comings, and Kenji Takahashi, 2012, *Potential Impacts of a Renewable and Energy Efficiency Portfolio Standard in Kentucky*	Kentucky	A study of the impact of energy efficiency and renewable energy programs on Kentucky's economy projected a net increase of 28,000 job-years by 2022. This is due to the increase in the cost of electricity when there is the added cost of complying with a carbon regulation.
David Roland-Holst, 2008, *Energy Efficiency, Innovation, and Job Creation in California*	California	Energy efficiency measures implemented in California from 1976 to 2006 have resulted in creating 1.5 million savings-related jobs while future policies have the potential to create 403,000 more direct (investment-related) jobs up through 2020.

CITATION (AUTHOR, DATE, TITLE)	REGION	KEY FINDINGS
EDR Group, 2012, *Economic Impact of PG&E Proposed Generation, Distribution & Related Infrastructure Investments*	California	An analysis of PG&E's proposed energy efficiency initiatives in California found that impacts would include the creation of 30,000 jobs annually in the PG&E service area and 39,000 jobs annually across the entire state.
EcoNorthwest, 2012, *Economic Impacts From Energy Trust of Oregon 2011 Program Activities*	Oregon	A study by ECONorthwest estimated that in Oregon, 1,235 jobs were sustained by energy efficiency activities in the year 2011.
ACEEE, 2013, *Louisiana's 2030 Energy Efficiency Roadmap: Saving Energy, Lowering Bills, and Creating Jobs*	Louisiana	This study estimates that implementing residential and commercial efficiency programs will result by 2030 in the creation of net 27,100 PYEs (in that year) and $1 billion additional dollars in wages.
Economic Development Research Group, Inc., 2005, *Economic Impacts of Cost-Effective Energy Efficiency: Final Report on Proposed CPS Programs*	San Antonio, Texas	This study of the impacts of establishing proposed energy efficiency programs in San Antonio would realize 1700 investment-related jobs each year, by the programs' tenth year.
ACEEE, 2013, *New Orleans' Efficient Path to 2030: Leadership to Save Energy, Lower Bills, and Create Jobs*	New Orleans, Louisiana	By 2030, implementing residential and commercial efficiency programs in New Orleans will result in the creation of 1,500 PYEs and $62 million additional dollars in wages.

Appendix 2 – Literature Review of Health Impacts Associated with Improved Energy Management

CITATION (AUTHOR, DATE, TITLE)	KEY FINDINGS
Vivian Loftness, Volker Hartkopf, Beran Gurtekin, David Hansen, Robert Hitchcock, 2003, *Linking Energy to Health and Productivity in the Built Environment: Evaluating the Cost-Benefits of High Performance Building and Community Design for Sustainability, Health and Productivity*	Improvements in indoor air quality, temperature control, lighting system quality, and access to the natural environment are linked to increased individual productivity. A range of design strategies, including increasing outdoor air ventilation rates, improving ventilation effectiveness through improved HVAC systems, and decoupling ventilation and thermal conditioning can lead to these productivity improvements. However, in order to achieve both health and energy savings it is important to pursue high performance technology that improves the IEQ of buildings without resulting in energy costs.
Olli A. Seppänen, William Fisk, 2006, *Some Quantitative Relations between Indoor Environmental Air Quality and Work Performance or Health*	This study looked at the change in performance per increase of 10L/s (liters per second) per person in ventilation rate. The result was a clear trend of increasing performance with increased ventilation rate up to levels of 16 L/s per person.
Romm and Browning, 1994, *Greening the Building and the Bottom Line*	After a building undergoes a lighting retrofit with parabolic louver fixtures and high-efficiency fluorescent lights, this study shows a 13.2% increase in productivity, a 25% reduction in absences, and a 69% energy savings in the lighting sector.
W. J. Fisk, D. Black, G. Brunner, 2011, *Benefits and costs of improved IEQ in U.S. offices*	The economic benefits of improving indoor environmental quality (IEQ) in the US building stock is estimated at $20 billion per year. The majority of these IEQ improvements can be achieved while also achieving energy savings, although a few are associated with small increases in energy costs.
Robert J. Rose, Jack Dozier, 1997, *EPA Program Impacts Office Zoning*	Temperature control is clearly linked to energy savings. On average, HVAC systems with independent controls for each room save 43% more energy than large-zone HVAC systems. Temperature control is further linked to worker productivity and comfort.
Amanjeet Singh, Matt Syal, Sue C. Grady, and Sinem Korkmaz, 2010, *Effects of Green Buildings on Employee Health and Productivity*	This study observed the effect on health and productivity for workers moving from conventional office buildings to those with green building ratings according to LEED. In two different case studies it was found that the improved IEQ in the green buildings led to reduced absences, lower reports of asthma and depression, and self-reported productivity improvements.
McGraw-Hill Construction, 2009, *Green Building Retrofit & Renovation*	A 2009 survey showed that 50% of tenants who moved into a green space did so partly because they anticipated productivity gains.

CITATION (AUTHOR, DATE, TITLE)	KEY FINDINGS
S. Abbaszadeh et al., 2006, *Occupant Satisfaction with Indoor Environmental Quality in Green Buildings*	Workers in green buildings self-report that they are more satisfied with the thermal comfort and air quality than occupants on non-green buildings.
Thayer, 1995, *Daylighting and Productivity at Lockheed*	This case study suggested that a building designed around daylighting, which integrates layout, window placement, type of glazing, and ceilings, results in 50% energy savings in lighting, ventilation, and cooling energy, and reduced absences 15% compared to the company's previous office building.
Figueiro et al., 2002, *Daylight and Productivity - A Field Study*	During the winter, workers in windowed offices with access to daylight spend 15% more of their time doing work-related tasks in the office and use 35% less electric lighting than workers without windowed offices.
Milam, 1992, *Underfloor Air Distribution HVAC Analysis*	Floor-based ventilation is linked to both first cost and energy savings. Underfloor air distribution systems saved 1.55 kWh per square foot more than ceiling-based air ventilation system. Increased ventilation is one of the most basic ways to improve building IEQ and worker health and productivity.
National Lighting Bureau, 1989, *Lighting and Human Performance: A Summary Report*	The NLB identified a 6% increase in worker productivity, accompanied by a 65% decrease in lighting energy consumption when a building was retrofitted with high-efficiency fixtures and full-spectrum fluorescent lights.
Jones Lang Lasalle, 2012, *Connected City*	Cities that invest in smart grid technology improve the effectiveness of energy production and distribution and implement programs that encourage energy efficiency at a corporate level. This, in turn, leads to productivity improvements within corporations and for the entire city.
U. Haverinen-Shaughnessy, D. J. Moschandreas, R. J. Shaughnessy, 2010, *Association between substandard classroom ventilation rates and students' academic achievement*	Improved student and teacher health, decreased absences, increased productivity, and reduced operational costs are all benefits of improving IEQs within the classroom. The most basic step to improving IEQ is providing good ventilation, which this study shows is linked to improved academic achievement in fifth graders.
Nicklas and Bailey, 1996, *Energy Performance of Daylit Schools*	Students in daylit classrooms perform 3% above the average performance of all students in the county, and daylit schools use 60% less energy than non-daylit schools.

Appendix 3 – Service Provider Survey

Responding Firms

At the time of this writing, 16 firms had completed MIT GEDI's Service Provider survey. These firms perform a range of different energy services, with many noting multiple services (see Figure 9). These firms varied in size and number of employees (see Figure 10). Over half of respondent firms had received a majority of their income from energy efficiency services, though for many efficiency services comprise a smaller portion of their income (see Error! Reference source not found.) (see Figure 11). For many of the smaller businesses reviewed, customers in the Seattle Metro Area comprised a majority of their revenue, and projects in Bellevue comprised a significant portion of revenue for many of the firms (see Figure 12). Likewise, most firms had a significant number of employees that lived in the metro region, and some in Bellevue (see Figure 13).

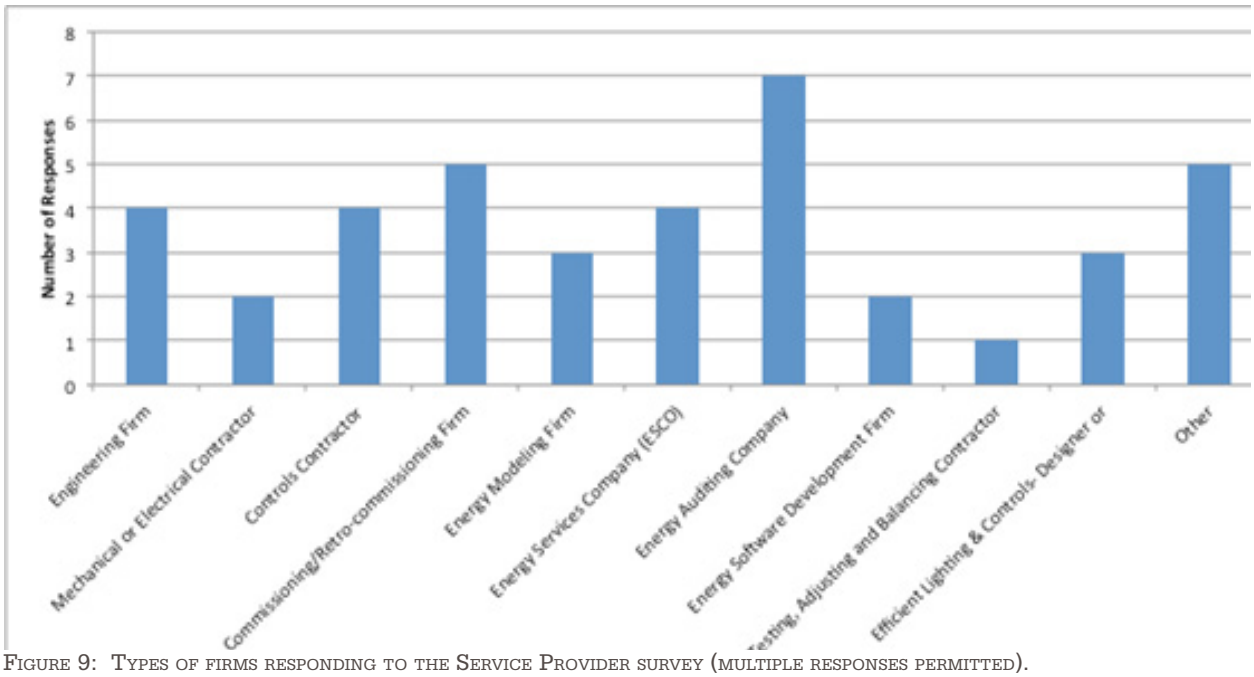

Figure 9: Types of firms responding to the Service Provider survey (multiple responses permitted).

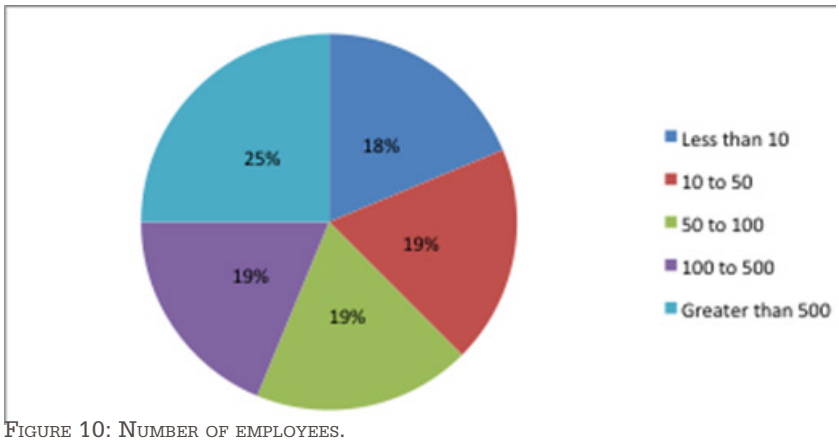

Figure 10: Number of employees.

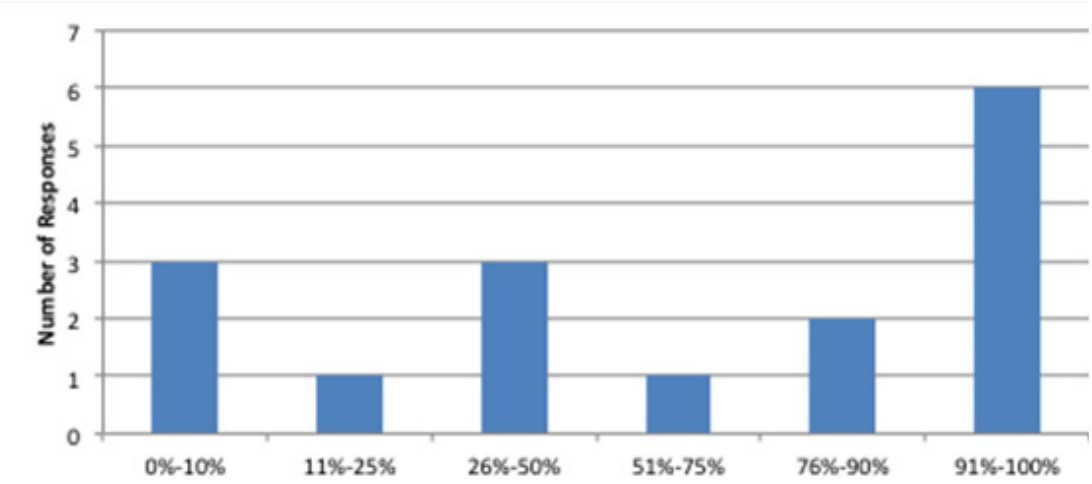

Figure 11: Percentage of firms revenue from energy efficiency services.

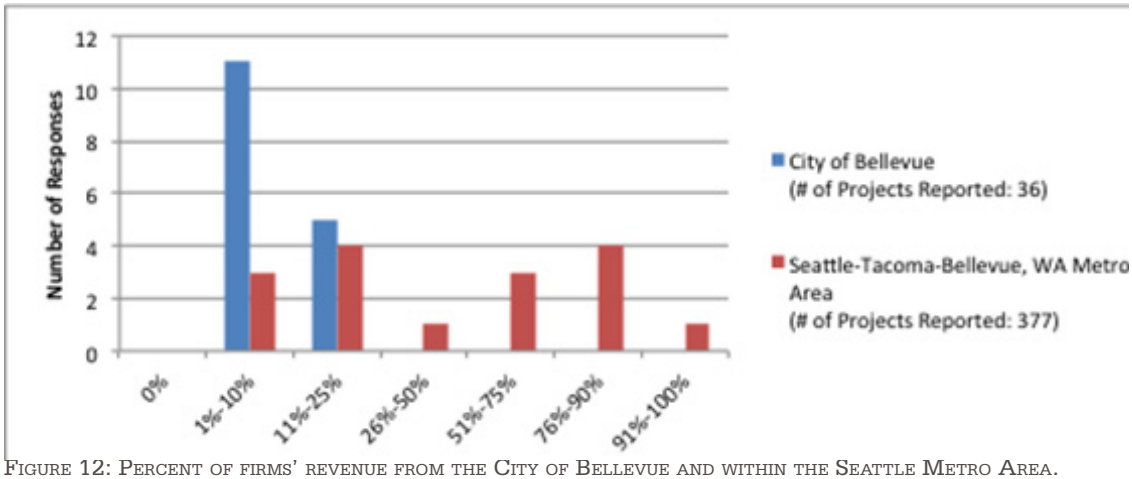

Figure 12: Percent of firms' revenue from the City of Bellevue and within the Seattle Metro Area.

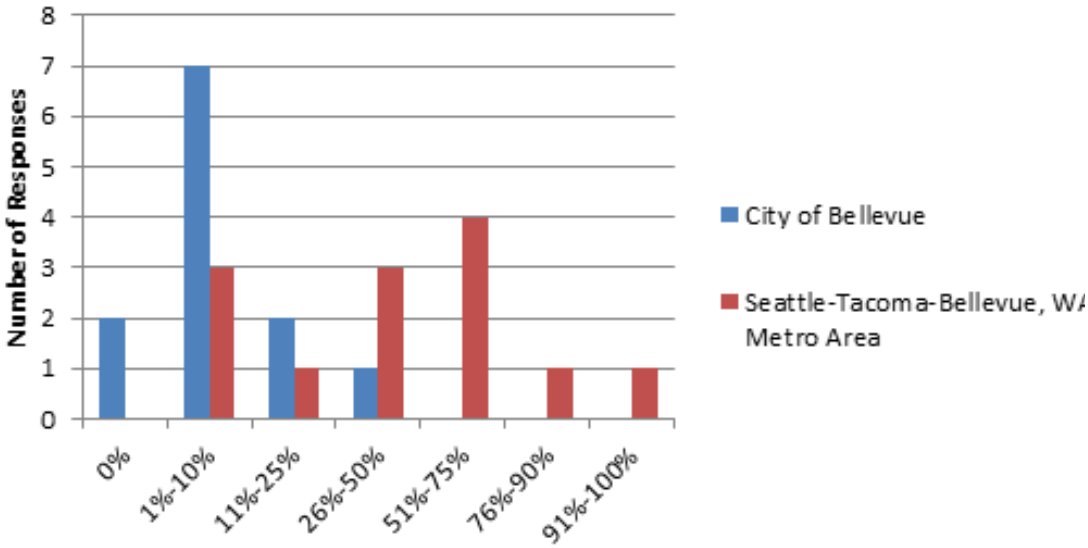

Figure 13: Percentage of employees from the City of Bellevue and Seattle Metro Area.

National Association of Energy Service Companies (NAESCO) is a national trade association aimed to promote the development of energy efficiency industry. NAESCO acknowledge NAESCO-Accredited status to elected member companies based on their core competencies and business practices. NAESCO Accredited ESCO should have significant experience with performance-based contracts, have the technical and managerial competence to provide full range of services, designing and implementing projects involving multiple technologies. NAESCO Accredited ESP should be capable to offer additional energy supply options besides all the services offered by Accredited ESCOs. As a major industry organization, EAESCO through the accreditation program gives companies an edge when they compete for major projects. Of the 24 ESCOs that are elected by to participate in the NAESCO Accreditation Program, eight companies have regional branches of offices in the WA. Four of them are identified as NAESCO Accredited ESCO, including Schneider Electric, Honeywell Energy Services, Eaton Corporation, and Trane. The other four companies are NAESCO Accredited ESP, including Ameresco Quantum. Burns & McDonnell, Johnson Controls, and Siemens. Most of these companies are industry and technology leaders, operating in international markets, and having expertise in others sectors related to energy efficiency. They could be the key partners in developing energy efficiency service industry cluster.

Clients and Marketing

A disproportionate percentage surveyed firms' revenue came from institutional buildings, notably hospitals, government buildings, universities and schools (see Error! Reference source not found.) (see Figure 14). This finding is consistent with those from national surveys of Energy Service Companies, which indicate that markets for energy services in commercial office space are under-developed (Satchwell, Goldman, et al., A Survey of the U.S. ESCO Industry: Market Growth and Development from 2008 to 2011 2010). Amongst office buildings, a number of firms derived a substantial proportion of their revenue from Class A office space, while class B and C buildings are largely un-served by these firms (see Figure 15).

Energy service firms indicate that their most important source of work stem from relationships with past clients and referrals (see Figure 16). These answers suggest that brokering relationships and referrals can be an important means of growing markets for energy efficiency services.

Figure 7: Types of firms responding to the Service Provider survey (multiple responses permitted).

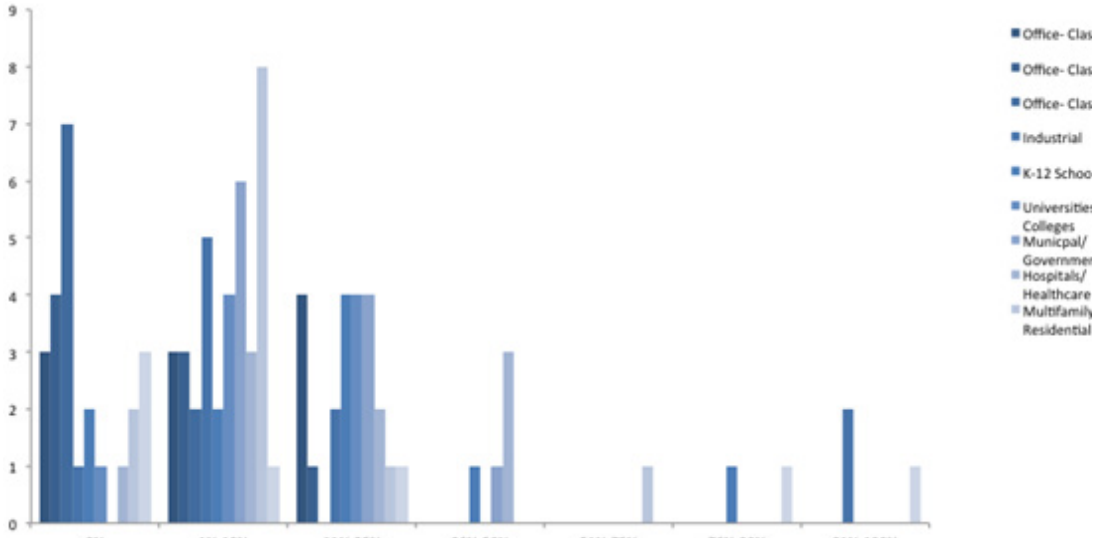

FIGURE 14: REVENUE FROM DIFFERENT BUILDING TYPES.

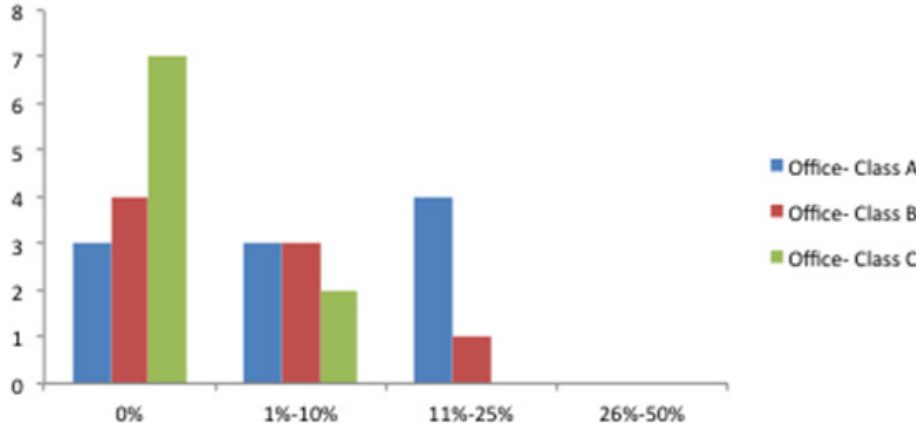

FIGURE 15: REVENUE FROM DIFFERENT OFFICE MARKET CLASSES.

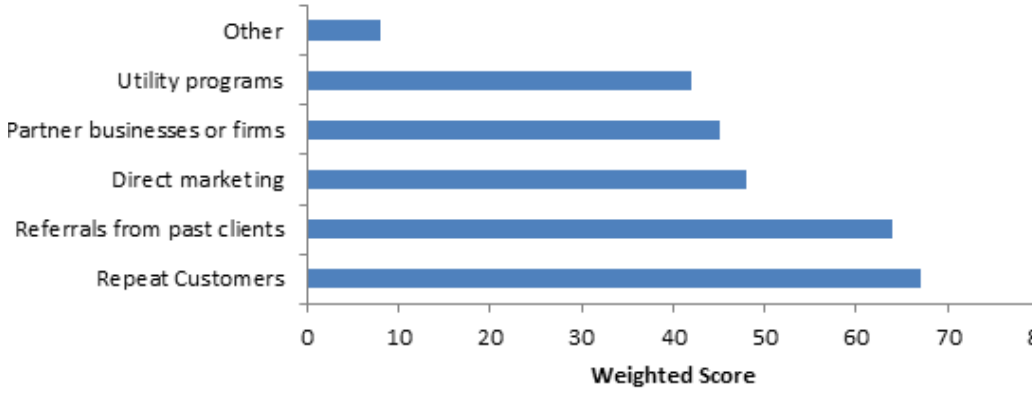

FIGURE 16: MOST IMPORTANT SOURCES OF CLIENTS, BY WEIGHTED RANK SCORE.

Obstacles to Market Development

Firms indicated that they face a number of obstacles to securing work providing energy efficiency services to existing buildings. These obstacles can be grouped into the following categories:

- ***Access to project financing capital*** – firms noted that potential clients are concerned about the cost of energy efficiency services. Given the extent of cost-effective efficiency opportunities in the market, this suggests that firms are concerned about investing in the diagnostic stages of energy upgrades, when identifying energy savings opportunities is not guaranteed. Additionally, it suggests that many firms do not have cash on hand, nor access to appropriate financing vehicles, to engage in energy upgrades.
- ***Clients' limited capacity and knowledge of energy opportunities*** – Firms feel that many clients' staff have insufficient time and capacity to procure energy services and implement projects. Additionally, owners, property managers and building operators' understanding of energy saving opportunities is a barrier. One firm noted in comments that regulatory requirements are needed to motivate building owners, while others cited the need for greater financial and social motivation of owners.
- ***Split incentives between owners and tenants*** – Firms note that the "split-incentive" whereby tenants pay utility bills but owners must invest capital in upgrades is a barrier. Different financing mechanism or the adoption of "green" or "energy-aligned" leasing terms can mitigate these problems.

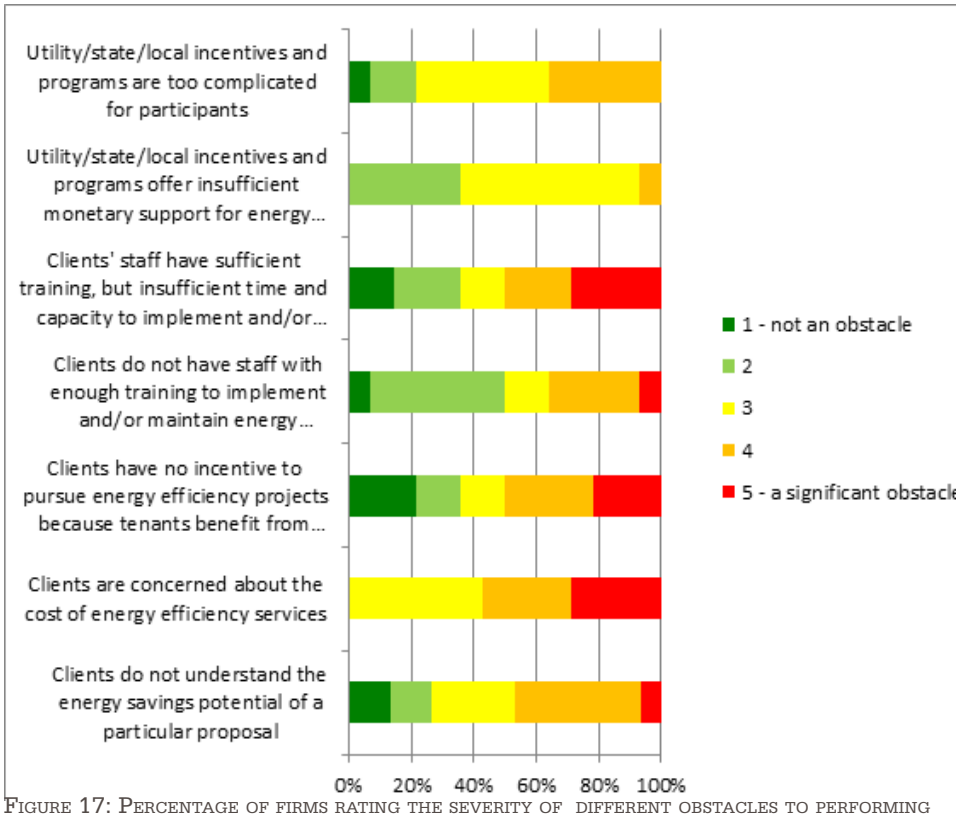

Figure 17: Percentage of firms rating the severity of different obstacles to performing energy services.

Workforce

Firms also noted some difficulty recruiting candidates with sufficient skills and credentials to serve in the energy services industry, and to a lesser extent facilitating on the job training (see Figure 18). Firms estimate they spend a longer period of time searching for senior level project managers than entry-level staff, perhaps suggesting the need for ongoing professional development (see Figure 19).

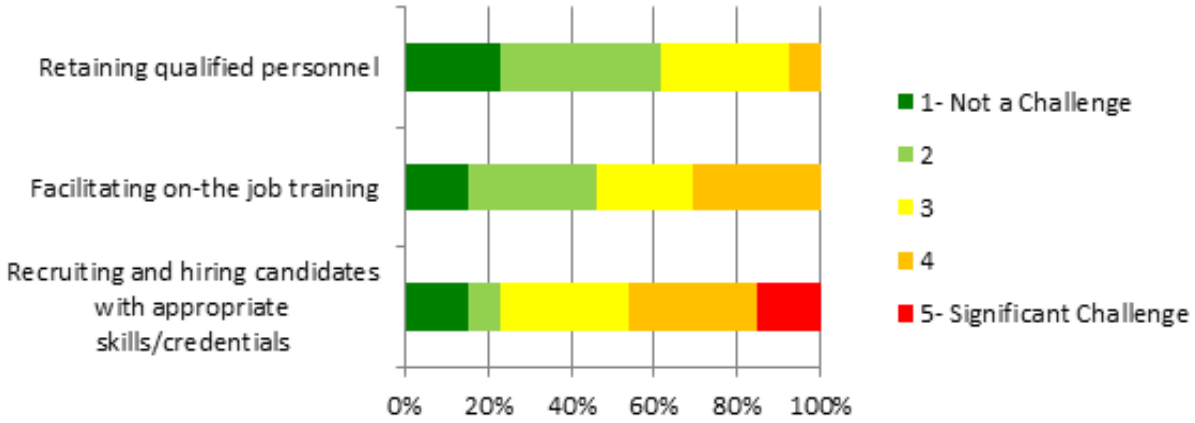

Figure 18: Percentage of firms rating the severity of different challenges to employing a skilled workforce.

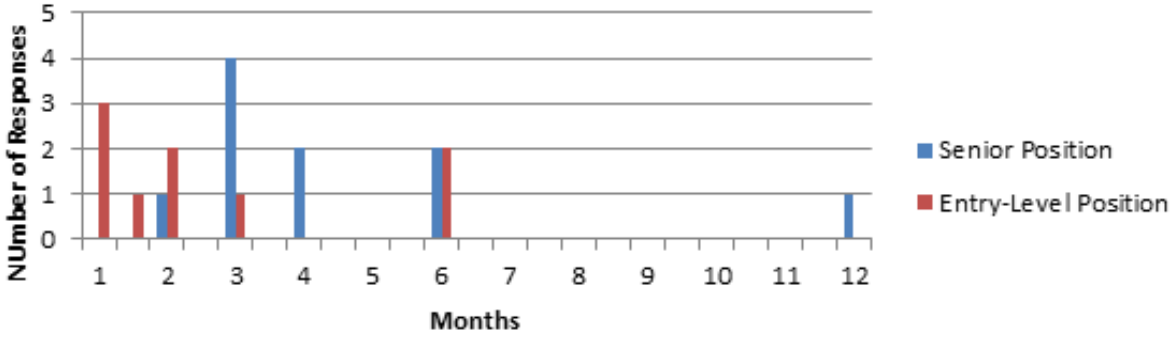

Figure 19: Amount of time estimated firms must search to hire senior and entry level staff.

Appendix 4 - Property Managers & Building Owners Survey

At the time of this writing, MIT GEDI had interviewed the property managers and/or owners of eight buildings in Bellevue. The following data and preliminary conclusions may be augmented with further surveying this summer.

Energy Management Activities

The interviews with building owners and property managers suggest that most facility managers, particular those in largely buildings or responsible for sizeable portfolios, prioritize energy management and understand the potential for energy savings; nevertheless, the interviews do suggest that there are significant opportunities to realize further savings.

Most of the buildings surveyed had undertaken some sort of substantial upgrade aimed at reducing energy consumption (see Table 6). However, comprehensive retro-commissioning and/or retuning were less common; many property managers indicated that they would only undertake retro-commissioning when they noted significant problems with energy systems, a practice that does not allow facility managers to identify less obvious energy savings opportunities (see Table 7).

Half of the interviewees benchmarked their buildings' energy performance using Energy STAR Portfolio Manager or some other system (see Figure 20). The buildings that benchmarked performance were all larger buildings, parts of large portfolios, or institutional buildings. It is likely that energy benchmarking is more prevalent in these larger buildings, though some larger buildings and institutional buildings did not benchmark performance.

The interviews suggested that energy management

Table 6: Number of surveyed buildings engaged in building system upgrades.

	YES	NONE	% YES
Lighting Fixtures	7	1	88%
Lighting Controls	5	3	63%
HVAC Systems	5	3	63%
Building System Controls	5	3	63%
Envelope Improvements	1	7	13%
Introduced strategies for plug-load reduction	4	4	50%

Table 7: Frequency of retro-commissioning.

Every 1-3 years.	0
Every 4-5 years.	1
Every 6-10 years.	1
Every 11+ years.	0
The building does not undergo retro-commissioning.	3
We continually commission and function test our systems	0
Other: As needed	3

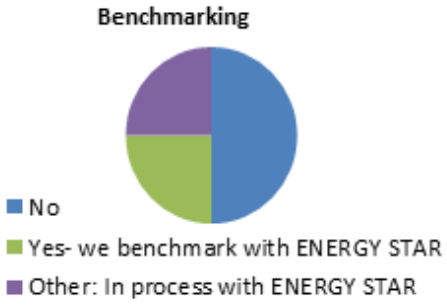

Figure 20: Building Benchmarking Practices.

service providers have established relationships with larger buildings; three of the 8 buildings surveyed contracted out energy management services to a third party, and two of the eight were covered by contracts with Energy Services Companies that provide opportunities for turn-key project management and financing.

Professional Development of Facility Managers

Many interviewees noted that they pursue a range of energy management training and credentialing for their building management and operations staff. These efforts include sponsoring facility managers participation in trainings, and working with service providers to upskill employees. Most noted they would be interested in further opportunities. Interviewees noted that their staff held a variety of credentials, including:

- LEED Accredited Professional, Operations & Maintenance.
- Building Operator Certification (Levels 1 & 2).
- Building Owners and Managers Institute certificates.
- Association of Energy Engineers Certified Energy Manager.

This range of credentials suggests that while owners and property managers increasingly value energy managements skill-sets, there may be confusion as to which credentials best confer skills. Indeed, the US Department of Energy is in the process of developing standard job task descriptions, which would standardize the energy-related competencies that facility managers and building operators ought to possess.

Barriers to Energy Management Practices

presents interviewees' response to what they felt were the most significant barriers to adopting stronger energy management practices in their buildings. Significant barriers included:

- **Capital constraints** – Most respondents cited limited capital as a barrier. Interviewed property managers and building owners indicated that they generally rely on owners' cash reserves to finance energy efficiency improvements. Only two had used an energy service agreement, and none had assumed debt (see Figure 21). Likely, because they rely on cash reserves, respondents illustrated rather limited financial "hurdle rates" – they typically cited a four-year simple return on investment as the threshold beyond which they would not invest in energy efficiency. Introducing novel project financing mechanisms, and changing the perceptions of energy projects, could allow for deeper energy upgrade measures to be pursued.
- **Limited motivation, time and capacity** – Interviewees noted that constraints on time, and to a lesser extent lack of information, where barriers to adopting energy management practices. Many interviewees noted the importance of local government facilitating owners' and managers' education, both in terms of training as well as helping facilities' staff better understand the energy upgrade opportunities available to them. Half of respondents felt that public recognition from the City of Bellevue would not result in any greater uptake of upgrades, though three respondents noted it would influence their decision-making (see Figure 22). Most respondents felt that making utility energy efficiency programs easier to navigate would increase participation (see Figure 23 and Figure 24).
- **Split-incentives** - Of the seven buildings with potential "split-incentive" issues (whereby the tenant pays for utilities, but the owner is responsible for capital upgrades), two building owners indicated they currently used green lease language, and another two indicated they would consider it. One interviewee noted that government should play a role in "addressing the split-incentive issue".

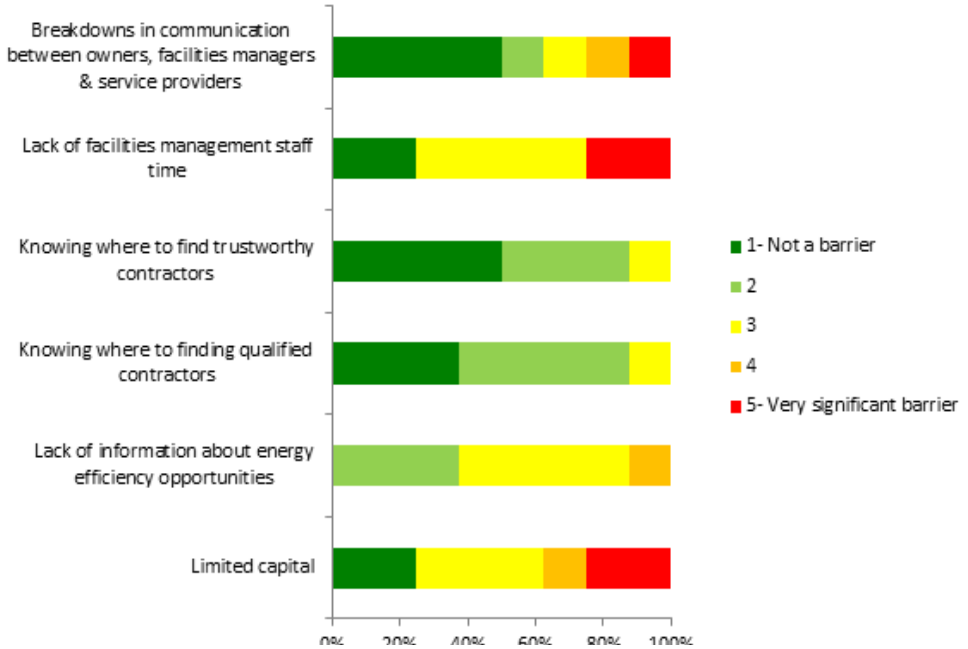

FIGURE 21: PERCENTAGE OF FACILITY MANAGERS RATING THE SEVERITY OF DIFFERENT BARRIERS TO ENERGY EFFICIENCY.

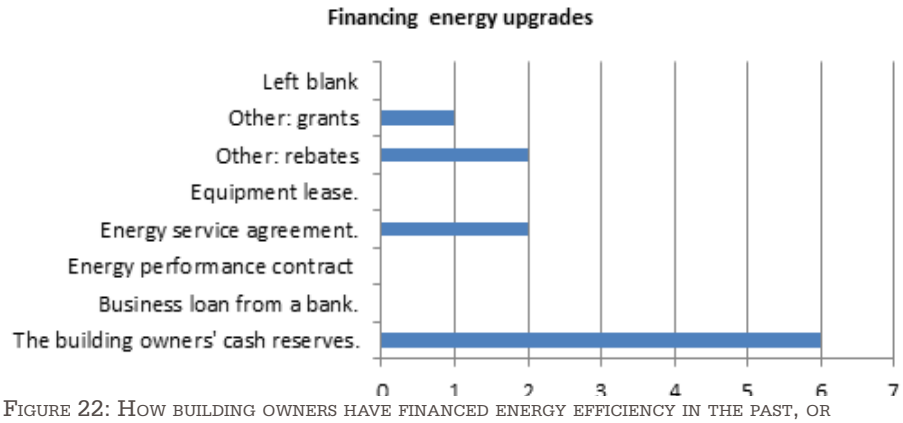

FIGURE 22: HOW BUILDING OWNERS HAVE FINANCED ENERGY EFFICIENCY IN THE PAST, OR BELIEVE THEY ARE LIKELY TO FINANCE IT IN THE FUTURE.

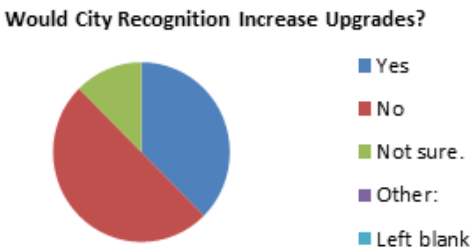

FIGURE 23: INTERVIEWS COMMENT ON WHETHER CITY RECOGNITION WOULD INCREASE ENERGY UPGRADES.

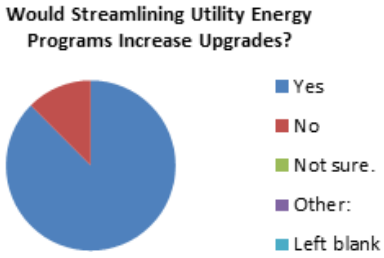

FIGURE 24: INTERVIEWS COMMENT ON WHETHER STREAMLINING UTILITY PROGRAMS WOULD INCREASE UPGRADES.

Appendix 5 - Regional Cleantech Organizations

Washington Clean Technology Alliance (WCTA) is a leading organization in Washington State focusing on promoting the growth of cleantech companies, jobs, and products as well as cutting-edge clean tech innovation in the State. WCTA with its 200 members built a network covering over ten industries around this field, and supports clean technology entrepreneurship via public policy advocacy, events and networking, communication systems building, and business services provision.

Northwest Clean Energy Angels (NCEA) is a Washington non-profit organization and business network that connects members with outstanding cleantech entrepreneurs. NCEA started in 2006 as the first early-stage investment group in the United States to focus exclusively on cleantech industries, particularly on start-ups at pre-venture capital stage, and has 70 members with an aggregate investment of over $10 million in 39 companies to-date. The typical capital scale is $25,000–$50,000 per investment, and $200,000 per business idea. The funds are not pooled; members make their own investment decisions while sharing due diligence and the wealth of experience of a powerful network of investors, entrepreneurs, venture capitalists, executives, scientists, engineers, bankers and attorneys. NCEA also mentors the companies that it invests in.

The Northwest Building Energy Technology Hub (NBETH) is a statewide test bed and demonstration center for building energy technology development and commercial acceleration. Funded by the i6 Green Challenge Grant from the U.S. EDA and U.S. DOE, and co-managed by Innovate Washington Foundation (IWF), the Puget Sound Regional Council (PSRC), the Cleantech Open, South Seattle Community College, the City of Seattle, and the Northwest Energy Efficiency Alliance (NEEA), NBETH plans to create a network of technology innovators, investors, industry, and policymakers in the Pacific Northwest to facilitate the exchange of ideas, resources, and information about market and funding opportunities.

Integrated Design Lab of University of Washington (IDL) connects interdisciplinary intellectual resources in the University of Washington in researches on energy efficient building design, and is known as a pioneer in design performance (new building) and hospital facility retrofit (existing building). Currently IDL is using the Bullitt Center building (where it located) as a laboratory to track data and develop a model for energy efficiency ROI, construction, and operation. IDL helps facilitate technology marketization through design guidance, technical assistance, and project-accompanied training. IDL coordinates with the building design, construction, utility, real estate, and ESCO communities to explore the “integrated design-construction-operation” approach to transform the energy efficiency market.

Appendix 6 – Utility Ratepayer Funded Energy Efficiency Programs Serving the Commercial Sector

COMMERCIAL CUSTOM GRANT PROGRAM

Target Market: Larger buildings with more extensive upgrades.

PSE Administration Group: Building Performance Team.

Notes: Provides grants on based on energy savings. Available for more comprehensive and non-standard energy upgrades.

RESOURCE CONSERVATION MANAGER

Target Market: Largest customers (about 400 eligible in PSE's service area).

PSE Administration Group: Building Performance Team.

Notes: PSE sponsors an RCM (~$25k/yr) to work in organizations and implement energy management projects.

COMPREHENSIVE BUILDING TUNE UP (CBTU)

Target Market: Generally, large buildings (greater than 50,000 sf); occupancy at least 75%; age at least 3 years; controls, mechanical, or metering equipment requirements; engaged operations and maintenance staff (customer must commit O&M staff time up to 50 hours for trainings and meetings). Customer must commit to implement all measures within a specified payback - 2 years.

PSE Administration Group: Building Performance Team.

Notes: Commissioning service providers deliver the program. PSE provides these service providers: standard forms and templates; training on program; some trainings on EBCX; customer engagement materials such as brochure and case studies.

SIMPLIFIED BUILDING TUNE UP (SBTU)

Target Market: Generally, large buildings (greater than 50,000 sf). Provides training of management and operations staff, and monitors their performance. Program offered for free.

PSE Administration Group: Building Performance Team.

Notes: Staff report that despite the program being offered for free, their has been limited uptake.

COMMERCIAL REBATES

Target Market: Commercial buildings of various sorts.

PSE Administration Group: Commercial Rebates Team.

Notes: PSE provides incentives for single replacements of equipment. Often, contractors will deliver only one or a few efficiency measure installations.

Appendix 7 – Energy Management Credentials

This list includes credentials for the following job categories, as defined by the US Department of Energy:

- Energy Auditor – Assesses building systems to develop recommended energy upgrade programs.
- Energy Manager – Manages energy consumption in buildings across facilities, performing continuous site evaluation and improvement.
- Commissioning/Retro-Commissioning Authority – Manages the development and implementation of documented (retro) commissioning processes.
- Operating Engineer/Building Technician. – Operates, maintains, and repairs equipment to maximize building performance. (US DOE 2013)

ADMINISTERING BODY	NAME OF PROGRAM	APPLICABLE JOB CATEGORIES	
Association of Energy Engineers (AEE)	Certified Energy Auditor (CEATM)	Energy Auditor	1
	Certified Energy Manager (CEM®)	Energy Manager	2
	Certified Building Commissioning Professional (CBCP®)	Commissioning/Retro-Commissioning Authority	3
	Existing Building Commissioning Professional (EBCPTM)	Commissioning/Retro-Commissioning Authority	4
	Certified Measurement & Verification Professional (CMVP®) (also administered by Efficiency Valuation Organization)	Energy Manager Operating Engineer/Building Technician	5
	Building Energy & Sustainability Technician (BESTTM)	Energy Manager Operating Engineer/Building Technician	6
	Government Operator of High Performance Buildings (GOHPTM)	Operating Engineer/Building Technician	7
	Energy Manager in Training (EMITTM)	Energy Manager	8
	Energy Auditor in Training (CEAITTM)	Energy Auditor	9
	Master's Level Certified Building Commissioning Professional (MCBCP)	Commissioning/Retro-Commissioning Authority	10
	Certified Building Commissioning Firm (CBCFTM)	Commissioning/Retro-Commissioning Authority	11
North American Technician Excellence (NATE)	HVAC Efficiency Analyst	Operating Engineer/Building Technician	12
Building Operators Certification	Building Operator Certification (BOC)- Level I	Operating Engineer/Building Technician	13
	Building Operator Certification (BOC)- Level II	Operating Engineer/Building Technician	14

ADMINISTERING BODY	NAME OF PROGRAM	APPLICABLE JOB CATEGORIES	
Green Building Certification Institute	LEED Accredited Professional (LEED AP) Operations and Maintenance (O+M)	Operating Engineer/Building Technician	15
AABC Commissioning Group (ACG)	Certified Commissioning Authority (CxA)	Commissioning/Retro-Commissioning Authority	16
	Certified Commissioning Technician (CxT)	Commissioning/Retro-Commissioning Authority	17
	Energy Management Professional (EMP)	Energy Manager	18
Building Commissioning Association (BCA)	Certified Commissioning Professional (CCP)	Commissioning/Retro-Commissioning Authority	19
	Associate Commissioning Professional (ACP)	Commissioning/Retro-Commissioning Authority	20
American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)	Building Energy Assessment Professional Certification (BEAP)	Energy Auditor Energy Manager	21
	Commissioning Process Management Professional Certification (CPMP)	Commissioning/Retro-Commissioning Authority	22
	Operations and Performance Management Professional Certification (OPMP)	Operating Engineer/Building Technician	23
University of Wisconsin-Madison, Department of Engineering and Professional Development	Commissioning Process Authority Professional (CxAP)	Commissioning/Retro-Commissioning Authority	24
	Commissioning Process Manager (CxM)	Commissioning/Retro-Commissioning Authority	25
	Commissioning Process Technical Service Provide (CxTS)	Commissioning/Retro-Commissioning Authority	26
	Green Commissioning Process Provider (GCxP)	Commissioning/Retro-Commissioning Authority	27
	Qualified Commissioning Process Provide (QCxP)	Commissioning/Retro-Commissioning Authority	28
BOMI International	Systems Maintenance Technician (SMT®) Designation Program	Operating Engineer/Building Technician	29
	Systems Maintenance Administrator (SMA®) Designation Program	Operating Engineer/Building Technician	30
	Building Systems Maintenance Certificate (SMC)	Operating Engineer/Building Technician	31
National Environmental Balancing Bureau	Building Systems Commissioning (BSC)	Commissioning/Retro-Commissioning Authority Operating Engineer/Building Technician	32
	Retro-Commissioning (RCx)	Commissioning/Retro-Commissioning Authority	33
International Facility Management Association	Sustainability Facility ProfessionalTM (SFP ®)	Operating Engineer/Building Technician	34
	Facility Management Professional (FMP®)	Operating Engineer/Building Technician	35
Northwest Energy Education Institute (NEEI)	Energy Management Certification	Energy Manager	36
University of California, Davis	Certificate Program in Energy Resource Management	Energy Manager	37
Energy Audit Institute	Commercial Energy Audit Certification	Energy Auditor	38
National Energy and Sustainability Institute (NEASI)	Commercial Energy Auditor Certification	Energy Auditor	39
Testing Adjusting and Balancing Bureau (TABB)	Certified Commissioning Supervisor (CCS)	Commissioning/Retro-Commissioning Authority	40
	Certified Commissioning Contractor (CCC)	Commissioning/Retro-Commissioning Authority	41

Appendix 8 – Some Energy Management Credential Programs in Seattle-Bellevue Metro Region

EDUCATIONAL INSTITUTION	CREDENTIAL OFFERED	JOB TYPE TRAINED FOR (MAY NOT ALIGN WITH CATEGORIES IN APPENDIX 7)
Degree programs		
Edmonds Community College	Energy Management Associate of Technical Arts; Opportunity for an Associate of Applied Science – Technical Degree with transfer to 4 year CWU Administrative Management program	Energy Manager; Energy Services Technician.
Cascadia Community College	Associate in Applied Science – Environmental Technologies and Sustainable Practice	Energy Services Technician; Facility Manager; Sustainability Manager
Bellevue College	Sustainable Business Practices – Associate in Arts	Various business and entrepreneurial positions.
Degree programs		
Renton Technical College and IFMA	Facility Management Professional Certificate; Sustainability Facility Professional	Facility Manager
Cascadia Community College	Community Energy Systems Specialist; Energy Audit Specialist Certificate	Energy Services Technician
Edmonds Community College	Commercial Lighting Auditor COC	Energy auditor (lighting)
	Energy Accounting Specialist COC	Sustainability Manager; RCM
	Building Operations and Maintenance for Energy Efficiency	Building Operator
Northwest Energy Efficiency Council	Building Operator Certification	Building Operator.

Appendix 9 – Business Engagement Program Development Considerations

Developing a business engagement program will require the City of Bellevue to convene and lead a multistakeholder program design effort. Resources from multiple sources will be required to implement the program. The following points outline important program development considerations.

Establish an agreement to leverage local government funds, utility funds, foundation grants, BOMA, NEEA, and/or the proposed Bellevue Center for Sustainability Practices, to support the early years of the program. Seek three years of funding. Aim for longer-term fee-for-service financial self-sufficiency thereafter – The Eastside 2030 District proposal is predicated on charging real estate interests for its services. This fee-for-service model has a number of limitations. Most importantly, it will limit membership to properties that are already substantially "bought-in" to the idea of energy efficiency, severely curtailing the opportunities to engage less sophisticated properties (which often have significant energy management opportunities). While such a fee-for-service model is attractive to minimize public spending, it also does not nearly the same potential to achieve the same level of efficiency uptake and associated economic development benefits.

Instead, MIT GEDI believes the stakeholders should aim to establish a Memorandum of Agreement between C-7 cities, NEEA, utilities, foundations, and Bellevue College to fund the program. The Challenge's basic offerings are free for any property that wishes to participate. More intensive programming may be offered on a fee-for-service basis.

Ideally, the program will be funded for three years. Experience from other jurisdictions has shown that participation in such programs tends to accelerate at the second year. During the third year, opportunities for refining and better tailoring program offerings emerge, and the transition to more fee-for-service programming is in a better position to be realized. Securing sufficient longer-term funding for such efforts can allow staff to focus on optimum program delivery over the course of its three-year life cycle.

A survey of 33 existing Energy Challenge programs found that annual budgets for programs of the size of the ESBA range from $100,000 to $400,000. The ESBA could aim for a $200,000 annual budget over three years. The program should aim to support at least 2 fulltime staff for this time-period.

Involve key stakeholders in Energy Efficiency programming design – The City of Bellevue should convene key stakeholders to pitch the City's proposed strategy to strengthen EE programming, and formulate an action plan to implement the program. Invitees should include:

- C-7 New Energy Partnership local governments.
- City of Seattle staff.
- Seattle 2030 District leadership, and representatives of the proposed Eastside 2030 District.
- Seattle-based Preservation Green Lab (of the National Trust for Historic Preservation), who

are developing an energy efficiency program targeting small commercial properties in WA state.

- Bellevue College personnel serving as touch points for the proposed Bellevue Center for Sustainability Practices (see below).
- Northwest Energy Efficiency Alliance commercial buildings programs experts.
- Northwest Energy Efficiency Council.
- Northwest Building Energy Technology Hub.
- Allied local businesses (area ESCOs) and real estate interests (Microsoft, etc.).
- PSE commercial and industrial DSM program administration senior staff.
- Any interested local foundations, political leaders, etc.
- Representatives from other green building challenge programs (Envision Charlotte, etc. – perhaps via electronic teleconference).

Upon establishing the direction for the energy management component of the Challenge, the City of Bellevue should lead in coordinating with other regional stakeholders interested in providing broader sustainability programming for properties (materials management, transportation, etc.) through the Challenge framework.

Consider aligning the program offerings for smaller commercial properties Preservation Green Lab's small business program – Numerous interviewees and much of the efficiency literature suggests that smaller properties require simple, "turnkey" program services and Preservation Green Lab is in the early stages of developing a small business energy efficiency program serving Washington state. The City of Bellevue should coordinate with them to assess opportunities to recruit local businesses into their program.

Continue the "green business challenge." – The 2012 "Challenge" lasted for a calendar year. In the future, the ESBA should anticipate multi-year engagement, and facilitate registration at anytime. ESBA programming should still be organized around an annual "cohort" of buildings, however, to facilitate program delivery and competition between properties. Registration should be facilitated online.

Integrate the proposed Eastside 2030 District to lead the green business challenge, if and when it comes online – The Seattle 2030 District (S2030D) is looked to as a national model for district-scale sustainability initiatives. Affiliates of the S2030D, notably "Catalyst 2030", have proposed establishing an Eastside 2030 District. However, Corey Weathers of Catalyst 2030 notes that the S2030D wishes to establish a larger base of deep energy upgrade projects within its territory before expansion; therefore, the Eastside 2030 District will be re-considered in Spring 2014. Alignment under the Eastside 2030 District banner makes strong sense for a Bellevue lead green building "challenge" initiative. It will leverage the brand, programming, IT and communications resources, staff capacity and experience of S2030D. However, the City of Bellevue and its partners should prepare for establishing an ongoing Eastside-based green building challenge, even if Seattle 2030 District is not positioned to expand.

Appendix 10 – Bellevue Benchmarking and Disclosure Ordinance - Proposed Language

The following is the proposed full text of an ordinance that Bellevue can test with stakeholders and ultimately take before council. Following each major section is a brief explanation of the rationale behind the proposal. The wording of this policy draws heavily from the State and Local Energy Efficiency Action Network's publication Benchmarking and Disclosure: State and Local Policy Design Guide and Sample Policy Language.

Section A. Definitions As Used in this Section

(1) "benchmark" means to input the total energy consumed for a building and other descriptive information for such building as required by the benchmarking tool.

(2) "benchmarking information" means information related to a building's energy consumption as generated by the benchmarking tool, and descriptive information about the physical building and its operational characteristics. The information shall include, but need not be limited to:

(a) Building address;

(b) Energy use intensity (EUI);

(c) Square footage;

(d) Annual energy consumption for each fuel type;

(e) Building type (office, school, industrial, public assembly, etc); and

(f) The energy performance score that compares the energy use of the building to that of similar buildings, where available.

(3) "benchmarking tool" means the U.S. Environmental Protection Agency's ENERGY STAR Portfolio Manager tool.

Discussion: This definition requires covered buildings to use the ENERGY STAR Portfolio Manager benchmarking tool. This was based off of the Seattle ordinance in order to provide consistency in the market.

(4) "building owner" means an individual or entity possessing title to a building, or an agent authorized to act on behalf of the building owner.

(5) "covered building" means:

(a) Any nonresidential building containing 25,000 or more gross square feet, or any residential building containing 20 or more dwelling units;

(b) Two or more buildings on the same tax lot that together exceed 25,000 gross square feet or 20 dwelling units;

(c) Two or more buildings held in the condominium form of ownership that are governed by the same board of managers and that together exceed 25,000 gross square feet or 20 dwelling units.

The term "covered building" shall not include any building owned by the Bellevue government.

Discussion: This definition sets the minimum building size threshold for covered buildings, and addresses the treatment of multiple buildings on a single parcel or held under common condominium ownership. The minimum threshold was set at 25,000 SF based on conversations with the city government and stakeholders. Note that Bellevue should seek regional consistency, and revise the ordinance as appropriate.

(6) "director" means the director of the City Council

(7) "dwelling unit" means a single unit consisting of one or more habitable rooms, occupied or arranged to be occupied as a unit separate from all other units within a building, and used primarily for residential purposes and not primarily for professional or commercial purposes.

(8) "energy" means electricity, natural gas, steam, heating oil, or other product sold by a utility for use in a building, or renewable on-site electricity generation, for purposes of providing heating, cooling, lighting, water heating, or for powering or fueling other end-uses in the building and related facilities.

(9) "energy performance score" means the numeric rating generated by the ENERGY STAR Portfolio Manager tool that compares the energy usage of the building to that of similar buildings.

(10) "ENERGY STAR Portfolio Manager" means the tool developed and maintained by the U.S. Environmental Protection Agency to track and assess the relative energy performance of buildings nationwide.

(11) " Bellevue government building" means any of the following:

(a) a building that is 10,000 gross square feet or more that is owned by the Bellevue government; or

(b) a building that is 10,000 gross square feet or more where a Bellevue government agency leases at least 5,000 rentable square feet of space.

Discussion: This definition sets the minimum building size threshold for buildings owned by the Bellevue government.

12) "tenant" means a person or entity occupying or holding possession of a building or premises pursuant to a rental agreement.

(13) "utility" means an entity that distributes and sells natural gas, electric, or thermal energy services for buildings.

Section B. Benchmarking Required for Bellevue Government Buildings

(1) No later than April 1, [xxxx], and no later than every April 1 thereafter, each Bellevue government building shall be benchmarked for the previous calendar year by the entity primarily responsible for the management of such building, in coordination with the director.

Discussion: This provision requires the annual benchmarking of Bellevue government facilities, increasing the ability of local governments to manage and reduce taxpayer-funded energy costs. It should be structured to take effect prior to private sector benchmarking requirements, ensuring that the government is leading by example.

Section C: Benchmarking Required for Covered Buildings

(1) Building owners shall annually benchmark for the previous calendar year each covered building and obtain an energy performance score as available according to the following schedule:

(a) A nonresidential building that is 50,000 gross square feet or more by May 1, [xxxx] and by every May 1 thereafter; and

(b) A nonresidential building that is 25,000 gross square feet or more, or a residential building that has 20 or more dwelling units, by May 1, [xxxx] and by every May 1 thereafter.

Discussion: This provision establishes a multi-

year implementation schedule based on a building's gross floor area or number of dwelling units. It is structured to affect the largest nonresidential buildings in a given area first, while extending the initial compliance period by an additional year for smaller nonresidential buildings and multifamily buildings. This phased approach makes implementation activities more manageable for the government and gives the market ample time to comply with policy requirements. Whereas many of the owners and operators of the largest nonresidential buildings have experience benchmarking, stakeholders of slightly smaller nonresidential buildings and multifamily buildings may require additional benchmarking resources and education, and would benefit from more time to comply.

Section D. Disclosure and Publication of Benchmarking Information

(1) The building owner shall annually provide benchmarking information to the director, in such form as established by the director's rule, by the date provided by the schedule in Section (C)(1).

Discussion: This provision requires the annual reporting of benchmarking information to the state or local government, enabling policymakers to track compliance, measure data quality, evaluate policy impacts, and leverage building energy performance metrics to inform the development of new policies and incentives. It is intended to complement additional disclosure requirements, including transactional disclosure and public disclosure. Bellevue should work with the Eastside Green Business Challenge to allow buildings to report via the Eastside Green Business Challenge framework.

(2) The director shall make available to the public on the internet, and update at least annually, benchmarking information for the previous calendar year for Bellevue government buildings no later than Sept. 1, [xxxx], and each Sept. 1 thereafter; and for covered buildings for the previous calendar year no later than Sept. 1, and each Sept. 1 thereafter, following the second annual receipt of benchmarking information. No benchmarking information received by the director in the first year a covered building is required to benchmark purvsuant to Section (C) will be published.

Discussion: This provision requires Bellevue to annually publish benchmarking information on a publicly accessible web site. Similar to the benchmarking implementation schedule in Section (C)(1), it establishes a multi-year publication schedule beginning with government facilities, followed by privately owned buildings. The publication of benchmarking information begins in year two of compliance for each building, meaning that no benchmarking information submitted by a building owner in the first year of compliance (according to the implementation schedule) will be published. This delay provides owners and operators a window of time to improve building energy performance before benchmarking information is published. Public disclosure increases public awareness and puts political pressure on buildings to comply.

Some existing policies, including that of Seattle, reference a different disclosure model known as transactional disclosure, whereby the building owner must release benchmarking information to prospective counterparties in a building financial transaction, such as a lease, sale or financing. In order to provide consistency in the market, Bellevue may wish to adopt a caveat through which the city will only require transactional disclosure until Seattle adopts public disclosure as well.

(3) The director shall make available to the public, and update at least annually, the following information:

(a) Summary statistics on energy consumption in Bellevue government buildings and covered buildings derived from aggregation of benchmarking information for those buildings;

(b) Summary statistics on overall compliance with this chapter;

(c) For each Bellevue government building and covered building:

(1) The status of compliance with the requirements of this chapter;

(2) Annual summary statistics for the building,

including energy use intensity, annual greenhouse gas emissions, and an energy performance score where available; and

(3) A comparison of benchmarking information across calendar years for any years such building was benchmarked.

Discussion: This provision establishes the information that must be published each year for individual buildings and requires the state or local government to annually publish aggregate compliance and energy performance statistics for the entire affected building stock. This type of jurisdiction-wide analysis can provide useful feedback for the government on the implementation or administration of the policy.

Note: Whole-Building Energy Consumption Data Access

Discussion: At this point, an ordinance developed for a state government would have a section establishing requirements for the transfer of historical, whole-building energy consumption data from utilities to building owners to facilitate benchmarking. Although Bellevue lacks the authority to require this from utilities, Puget Sound Energy already has a system in place to facilitate their customers who benchmark. PSE aggregates meter data for multifamily buildings and multi-tenant commercial buildings with four or more tenants. This allows multi-tenant buildings to benchmark by providing whole-building data. PSE thus provides owners with access to whole-building energy consumption data without compromising customer confidentiality. They have also linked their website to their new Customer Information System (CIS in order to check each account that is set up individually as an additional customer confidentiality safeguard. With PSE's updated system, owners or managers can provide either meter numbers or building addresses when requesting aggregated data. PSE is also planning to offer data on an automated monthly basis to reduce the compliance burden on building owners and managers and keep them up to date.

Section E. Providing Benchmarking Information to the Building Owner

(1) Each tenant located in a covered building subject to this chapter shall, within 30 days of a request by the building owner and in a form to be determined by the director, provide all information that cannot otherwise be acquired by the building owner and that is needed by the building owner to comply with the requirements of this chapter. A failure to provide information to a building owner may result in penalties as provided under Section (G)(2).

Discussion: This provision requires tenants to provide the building owner with the energy consumption data and space use characteristics required to benchmark. In practice, this provision should have limited applicability because many owners and building managers will already have access to most or all of the space use information needed to benchmark.

(2) Where the building owner is unable to benchmark due to the failure of any or all tenants to report the information required by Section (E)(1), the owner shall complete benchmarking using such alternate values as established by the director prior to the implementation of this chapter. The director shall evaluate the quality of any alternate values established pursuant to Section (E)(2) and propose revisions that increase the quality of such values prior to Dec. 31, [xxxx], and not less than once every 10 years thereafter.

Discussion: This provision requires the director to establish proxy or default values for use by building owners in benchmarking, to be used in cases where the owner is unable to benchmark due to a failure by tenants to provide energy consumption or space use information. The director may choose to reference proxy or default values that are already established, or create new values. The director must review any values established in this section periodically.

Section F. Violations

(1) It shall be unlawful for any entity or person to fail to comply with the requirements of this chapter or misrepresent any material fact in a document required to be prepared or disclosed by this chapter.

Section G. Enforcement

(1) If the director determines that a building owner has failed to report accurate energy benchmarking information pursuant to Section (D)(1), the director may seek the following remedies:

(a) A written warning may be issued for the first violation; and

(b) If benchmarking information is not reported within 15 days of the date the written warning is issued, the director may issue a notice of violation with a penalty fine of $150. Continued failure will result in additional fines of $500 each quarter for buildings 25,000 to 49,999 SF, or $1,000 for buildings 50,000 SF or greater.

Discussion: This provision gives the implementing agency authority to enforce noncompliance in the annual reporting of benchmarking information to the Bellevue government. The penalties were based off of the Seattle ordinance in order to provide consistency in the market.

(2) If the director determines that a tenant has failed to provide information to a building owner pursuant to Section (E)(1), the director may seek the following remedies:

(a) A citation of up to $150 may be issued for the first violation;

(b) A citation of up to $150 may be issued for the second violation within a 12-month period; and

(c) A citation of up to $150 may be issued for the third and subsequent violation within a 12-month period.

Discussion: This provision gives the implementing agency authority to enforce noncompliance in the disclosure of information by the tenant to the building owner.

Section I. Rules

(1) The director shall promulgate such rules as deemed necessary to carry out the provisions of this article.

Suggested Rules:

- Provide an option to undertake mandatory assessment. If a building performs poorly (e.g. ESPM score of less than 50, they are required to undertake mandatory assessment measures, such as audits or retro-commissioning. Mandatory assessments could be covered by a lower cost audit methodology.
  - **Rationale:** Mandating assessments could provide greater uptake of EE measures. City staff (the director) should coordinate with other local governments to ensure market consistency when it comes to this requirement.
- Require periodic third-party verification of benchmarking data. Data to be verified could be chosen randomly.
  - **Rationale:** Ensures integrity of reported data.
- Building owners are required to complete a Benchmarking Compliance Report that can be generated and submitted via Portfolio Manager.
  - **Rationale:** Provides a simple framework for building owners and manager to comply with.

Appendix 11 – Benchmarking and Disclosure Ordinance – Policy Development Considerations

Guidelines on how to engage stakeholders around the draft ordinance

ORGANIZE A TASKFORCE

The taskforce shall be comprised of a wide variety of public and private-sector entities including real estate stakeholders, environmental groups, energy efficiency advocates or consultants, government representatives, and utilities. Bellevue could also build on stakeholder relationships cultivated as part of the Environmental Stewardship Initiative Strategic Plan.

The taskforce shall include representatives from each stakeholder category; however, the composition shall be carefully designed so that the opposing parties don't overpower the supportive parties. Suggested taskforce member candidates include:

- Real estate / property community: Building Owners and Managers Association (BOMA) Seattle & King County Chapter, Urban Land Institute Northwest (ULI), JSH Properties, local property appraisal community
- Utility: Puget Sound Energy
- Energy service industries: representative ESCOs, Microsoft, Integrated Design Lab (UW), Washington Clean Technology Alliance, Innovate Washington
- Energy or sustainability-focused NGOs: Northwest Energy Efficiency Council (NEEC), IMT, Energy Foundation, Eastside Sustainable Business Alliance (ESBA), Preservation Green Lab, Emerald Cities Collaborative
- Government entities: King County, City of Seattle Office of Sustainability & Environment, City of Bellevue Office of Economic Development, Innovate Washington
- Workforce development community: Washington State Workforce Training and Education Coordinating Board (Washington Workforce Board), Bellevue College, Renton Technical College, Edmonds College, Cascadia Community College

KEY TASKFORCE RESPONSIBILITIES AND ORDINANCE DRAFTING PROCESS:

- Forming a consensus on the City's goals in adopting a benchmarking policy, and distributing the information to their respective communities using their existing networks
- Identifying the primary stakeholder concerns around the policy, both in terms of the barriers and collaboration opportunities

- Developing the ordinance via a deliberative process
- Identifying the key implementation tasks and responsible parties, in particular the win-win opportunities for the stakeholders participating in implementation

Guidance on which organizations should provide technical assistance and outreach

TECHNICAL ASSISTANCE

Leader: Northwest Energy Efficiency Council – has the willingness, capacity and experience, as well as resources to lead the technical assistance.

Partners: 1) IMT, Energy Foundation– IMT and Energy Foundation have been funding the technical staff for Seattle's benchmarking program. IMT also sent an expert to Seattle, who might be able to provide technical assistance to Bellevue.

2) King County – could assist in building a uniform reporting and evaluating platform for the County, training and sharing technical staff members

OUTREACH

Building owners and managers: BOMA and ULI have the capacity to reach Class A buildings owners; Bentall Kennedy and/or JSH Properties has the capacity to engage its clients; Integrated Design Lab has connection with the real estate sector; Preservation Green Lab may have good channels to reach Class B and Class C building owners; City of Bellevue Finance Department may have the opportunity to inform distant owners and small building owners of the policy via tax bills, and Bellevue Utilities performs small business outreach on recycling, water conservation, and waste reduction programs.

Tenants: Eastside Sustainable Business Alliance, City of Bellevue Office of Economic Development

Training and education: 1) local community colleges – Bellevue College, Renton Technical College, Edmonds College, Cascadia Community College

2) ESCOs and PSE – expanding their training programs which are already applied to Seattle's benchmarking program and 2030 District.

Stakeholder analysis

The following sections note key stakeholders, considerations around their interests regarding benchmarking, and potential roles they may play in developing and implementing the policy.

REAL ESTATE / PROPERTY COMMUNITY

Building Owners and Managers Association, Seattle & King County Chapter (BOMA) represents Class A building owners and managers, who are the major targets of benchmarking policy and have better capacity to handle energy management. Achieving economic returns is their priority and major concern when deciding on any energy efficiency project. ***They do not oppose benchmarking, but are against disclosure. Identifying an energy-efficiency-proactive BOMA member as a "Real Estate cheerleader" to have peer influence would facilitate conversation around benchmarking policy and help with compliance during implementation.***

Urban Land Institute Northwest (ULI) represents Class A building developers and managers, but has weak connections with the smaller (Class B and Class C) building community. ***ULI generally supports benchmarking policy, and could motivate some outreach and education resources through its energy efficiency expert Board member and connections with organizations and individuals in the area.***

JSH Properties (JSH) is a Bellevue based property management company. JSH has been extensively engaged in sustainability initiatives and has in-house experts to push energy efficiency undertake among its client buildings by providing consulting on policies and financial tools, and helping clients navigate the programs and processes of utilities and ESCOs. JSH has been cooperating with Seattle City in setting a roadmap to achieve district goals

by 2030 through the Strategic Energy Management Program (SEM) which includes Portfolio manager and RCM training. *JSH is willing to partner with the City of Bellevue on outreach and market education around energy efficiency through its network and resources.*

The local property appraisal community plays an important role in translating building attributes into market values, and has high professional credibility in the real estate market. *They could facilitate the recognition of buildings' energy efficiency value among building owners and tenants by adding an energy efficiency dimension to property evaluation. They are both the target of energy efficiency education and the market educator.*

UTILITIES

Puget Sound Energy (PSE) is an indispensable partner in benchmarking policy because they will provide technical support for data collection and reporting, and could embed outreach and training into their existing energy programs. *PSE's input in drafting the policy's technical details, policy implementation and evaluation will be very valuable. Getting PSE engaged may also help to improve other energy efficiency programs.* However, a few interviewees noted that it's hard get into contact with the right people at PSE, and that some of PSE's energy efficiency programs are so complicated that only a small number of people can understand and navigate them. Collaboration around the new policy provides opportunities for conversation between PSE and other parties about these problems.

ENERGY SERVICE INDUSTRY REPRESENTATIVES (FIRMS AND ORGANIZATIONS)

ESCOs are by nature supportive of policies that could potentially spur market demand for energy efficiency products and services. The firms that are actively engaged in local energy efficiency markets and that the City has reached out to during the early policy development stage – McKinstry, MacDonald-Miller, and Integrity Energy Services – *welcome a benchmarking policy which could bring them more business*. Regional industry leaders such as McKinstry and MacDonald-Miller also have training programs of their own or in collaboration with other organizations and programs (for example, MacDonald-Miller with Seattle 2030), therefore *they have the experience and resources to help with trainings around benchmarking policy*.

Microsoft has been very involved in energy efficiency policies in Washington State, for example, they sent a representative to participate in the Climate Action Team. As Microsoft is exploring the market potential of its innovative smart building management system through collaboration with Seattle 2030 District, it *considers Bellevue as another strategic partner, and supports Bellevue's uptake in benchmarking policy*. Besides, being a big commercial building tenant in Bellevue, *Microsoft could make a demonstration case of the benefits of energy efficiency programs*.

Integrated Design Lab (IDL) has extensively collaborated with the architectural design, construction, and engineering industries, and has contacts in the real estate community via its alumni network. IDL lately extended its research focus to include energy efficiency for existing buildings. *IDL supports benchmarking policy, and has the capacity to assist with outreach and training.*

Washington Clean Technology Alliance (WCTA) has been active in public policy advocacy for the clean technology industry. They think that a lack of market demand is a big barrier to innovations and entrepreneurs in energy efficiency technology, products, and services, so they *welcome mandatory benchmarking policy for its potential in promoting market demand*.

Innovate Washington is a Seattle based NGO aiming to accelerate technology-based innovation and entrepreneurship in Washington State. It has identified clean energy as a core focus sector, and collaborates with other public and private entities on two energy-related R &D and entrepreneur incubation programs - Northwest Building Energy Technology Hub (NBETH) and Clean Energy Partnership (CEP). *Innovate Washington supports benchmarking policy and has the capacity to assist with training*.

ENERGY OR SUSTAINABILITY-FOCUSED NGOS AND PUBLIC AGENCIES

Northwest Energy Efficiency Council (NEEC) is very supportive of increased energy use transparency as a key to driving investment in improving building energy efficiency, and is willing to help elevate this discussion amongst policy makers. *Having NEEC on board would gain Bellevue political support and media promotion around a benchmarking policy*. NEEC has gained experience in providing public assistance, for instance to Seattle on the technicalities of benchmarking, and has helped cities with ordinances achieve high compliance rates. *It is ideal to have NEEC lead the Technical Support, probably following an arrangement similar to Seattle's, to help Bellevue achieve high compliance in a cost-effective manner*.

IMT and Energy Foundation can provide funding for the benchmarking program after the initial funding from NEEC and the City has ceased. IMT is also a national leader in energy efficiency research and policy assistance. *Bellevue could seek funding and technical assistance from IMT and Energy Foundation*.

Preservation Green Lab (PGL) is a Seattle-based sustainability think tank launched in 2009 by the National Trust for Historic Preservation. PGL focuses on studying performance based codes and existing building retrofits/ reuses, particularly on smaller buildings (<50,000 sq. ft.). PGL is planning a new project in which it will partner with the National Renewable Energy Laboratory to provide low-cost energy efficiency services to small businesses in California, Wisconsin, New York, and Washington State. *Bellevue could collaborate with PGL to engage smaller building owners around the benchmarking policy, and also take advantage of PGL's new project.*

Emerald Cities Collaborative is a national non-profit network of organizations working together to advance a sustainable environment while creating greater economic opportunities. Its Seattle branch is engaged in a wide range of energy efficiency programs including collaborations with the City of Seattle, the Seattle 2030 District, MacDonald Miller Facilities Solutions, and Seattle Steam in building energy efficiency models and promoting retrofits. *Emerald Cities Collaborative supports benchmarking policy and has experience in public-private partnership with regard to policy design and implementation.*

GOVERNMENT ENTITIES

King County identifies increasing energy efficiency as a core target in the County's 2010 Comprehensive Energy Plan. The County has outlined a series of strategies including benchmarking County properties and facilities, collaborating with communities in benchmarking policy development, and conducting a robust educational campaign on what people can do to save energy. When interviewing the County they indicated that Bellevue could use King County's commitment as "an engaging tool to get the businesses within the community under its umbrella". *It is valuable to get the County on board and to align Bellevue's energy efficiency goal with the County's goal by making the case that Bellevue will promote market consistency by following Seattle's future policies such as public disclosure, audits, and retro-commissioning. Bellevue could also collaborate with the County in terms of tenant outreach and education*. The County has been pursuing sustainable funding strategies to provide seed money for up-front investments in energy efficiency projects. *Bellevue could potentially get the County's funding support by being another regional leader in energy efficiency initiatives.*

City of Seattle, Office of Sustainability and Environment *provided valuable suggestions from their experiences with their benchmarking program: 1) It is necessary to set penalties for non-compliance*: Seattle saw a significant increase in compliance rate after the penalty was introduced (quarterly accruing fine with Administrative review process; $4,000 annually for buildings larger than 50,000 SF, and $500 per quarter for smaller ones). Finance and Administration was the enforcement arm. It is suggested that building owners be allowed some response time between the notification or warning letter is issued and the penalty is enacted. *2) Constant and full-time technical assistance*: currently 3 full-time staff support the

online data service 8 am to 5 pm (initially it was staffed by part-time students from South Seattle Community College, but that didn't work well due to variability of schedule and personal contact with property managers). Technical assistance is constantly needed due to changes in managers, owners and operators. "Resource Media", an IMT partner helps with outreach. Interviewees suggest a *Seattle-Bellevue partnership to share technical assistance and achieve economies of scale. 3) Seattle's future policy plan for disclosure, audit and retro-commissioning*: Seattle now plans to adopt public disclosure because the lack of mandatory public disclosure has diminished the effects of the policy. Seattle is also considering adding audit and retro-commissioning policies, but currently the Seattle market is more willing to accept public disclosure than retro-commissioning.

City of Bellevue, Office of Economic Development has multiple channels and resources to reach businesses and advocate for the economic benefits of benchmarking and other energy policies.

WORKFORCE DEVELOPMENT COMMUNITY

Washington State Workforce Training and Education Coordinating Board (WA Workforce Board) is a government-appointed entity focusing on workforce development policies and programs. *WA Workforce Board generally supports benchmarking since it could potentially create jobs in energy efficiency sectors. It also has funding, networks, and resources to assist with training*.

Local and regional colleges including Bellevue College, Renton Technical College, Edmonds College and Cascadia Community College have training and certificate programs focusing on energy efficiency (engineering, property management, entrepreneurship and business). They have developed close relationships with the industry via collaborative course design, training and internship programs. *They are strategic partners of energy efficiency initiatives including, but not limited to, benchmarking. Getting them on board would create a win-win situation where the City could get more training resources and the colleges could improve their curriculums and intern programs*.