

Transforming Energy Management Markets:

A Strategy Development Guide for Economic Development and Sustainability Practitioners

FINAL REPORT



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Introduction

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In 2012-2013 the Massachusetts Institute of Technology Community Innovator's Lab Green Economic Development Initiative (MIT GEDI) partnered with local government agencies¹ on an "action research" project to develop energy efficiency market transformation strategies for commercial buildings in each agency's region. Researchers surveyed energy service firms, interviewed building owners and property managers, engaged community leaders and industry experts, conducted extensive market analysis, and reviewed over forty energy management credentials. This guidebook draws on that work and presents how communities can formulate commercial energy management market transformation strategies and suggests common policies, approaches, and tools to deploy such activities. It is intended to support your community's ongoing economic development and environmental initiatives.

Regional energy efficiency management programs have numerous benefits including energy savings, enhanced business profitability, job creation, improved real estate values, health improvements, business clustering, and contributions to mitigating environmental damage. Local strategies help maximize these benefits by creating a coordinated, shared effort.

Purpose of this Guidebook

This guidebook summarizes MIT GEDI's strategy development process and tools to:

- Explain the economic development benefits of improving energy management in commercial and industrial buildings
- Identify the barriers to effective energy management
- Provide a methodology to assess regional market conditions and develop an "Energy Management Market Transformation Strategy"
- Articulate roles that local governments, economic development organizations, and others can play in improving energy management practice
- Summarize knowledge on effective strategies, policies and practices to change market dynamics and expand investment in sound energy efficiency
- Present guidance on moving forward with implementation

The guidebook is intended for economic development organizations (EDOs), local government leaders, and sustainability professionals. Several tools developed during the action research phase (including reports for the five regions studied) are referenced throughout the guidebook and are also found online at MIT GEDI's website: <http://web.mit.edu/colab/gedi/capacity-energy-efficiency-market-transformation-strategy.html>

About the MIT CoLab Green Economic Development Initiative

MIT GEDI is a project of the Community Innovators Lab, a center for planning and development within the MIT Department of Urban Studies and Planning (DUSP), which focuses on advancing a socially just and environmentally sustainable economy. MIT 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 a grant from the Rockefeller Brothers Fund.

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A Note about Energy Management and Energy Efficiency

“Energy Management” refers to efforts to minimize buildings’ energy costs and meet other energy-related goals, such as comfortable, healthy indoor conditions and improved environmental performance. Energy Management strategies include:

- Reducing energy consumption via energy efficiency and conservation
- Implementing building-level generation of renewable and/or other energy resources
- Sourcing energy from cost-effective and sustainable suppliers
- Engaging in demand response and reducing electricity use during peak pricing times
- Ensuring operational efficiency through effective maintenance and operations
- Helping building users understand and participate in goals for energy management

See Appendix A for a more detailed list of several energy management activities.

This report focuses on the energy efficiency components of an energy management strategy because they offer the most cost effective solutions with the potential for the largest bottom-line impacts. Regardless of this focus, many of the strategies discussed in this report will be applicable to both energy conservation and building scale renewable energy investments. For example, new finance mechanisms such as Property Assessed Clean Energy (PACE) enables greater investment in both energy efficiency improvements and renewable energy.

Making the Case

Potential for Savings from Energy Management

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Energy management practices differ markedly in extent and quality across buildings. However, there are opportunities to cost-effectively save energy in virtually all buildings. Nationally, it is estimated that 30% of energy spending in existing commercial buildings could be saved cost-effectively through energy management.² Moreover, innovations in technologies and services and an increasing focus on climate change mitigation may support even greater savings in the coming decades. Commercial building owners and tenants can also save money and realize environmental goals by switching to more sustainable energy supply technologies, whose costs are falling rapidly.³

In 2010, U.S. commercial buildings consumed \$179 billion in energy costs;⁴ with this level of energy spending, reducing building energy consumption and switching to other energy types, represents a large market and economic opportunity. McKinsey & Company estimates that investing in all cost effective energy efficiency options in US commercial buildings could save \$165 billion in net present value terms over ten years.⁵ Additionally, creating a plan to reduce peak demand response loads could save between 5%-20% of peak demand, according to the Federal Energy Regulatory Commission.⁶

Integration of cost-effective distributed and low-carbon energy generation presents a further opportunity for profit. According to a study by the asset management firm Lazard Freres & Co., the levelized⁷ cost of renewable energy generation is becoming more competi-

tive with conventional sources of energy, with energy efficiency still ranking among the cheapest 'sources' of alternative energy by reducing consumption (See Figure 1).⁸ These values represent grid-scale electricity, but there are also sources of building-scale electricity and heating, such as solar PV, solar thermal, etc. that can be cost-effective compared to conventional energy sources on a life-cycle basis.

Unsubsidized Levelized Cost of Energy for Grid-Scale Use (2013)

Technology	Levelized Cost (\$/MWh)	
	Low End	High End
Energy Efficiency	\$0	\$50
Wind	\$45	\$95
Geothermal	\$89	\$142
Solar PV	\$89	\$204
Solar Thermal	\$125	\$164
Gas Peaking	\$179	\$230
Gas Combined Cycle	\$61	\$87
Nuclear	\$86	\$122
Coal	\$65	\$145

Figure 1: The cost of alternative energy is becoming more competitive with conventional sources. Energy efficiency continues to provide the most cost effective results.⁹

Looking specifically at energy efficiency, potential savings typically increase with longer-term payback periods (See Figure 2). Thus, efforts to maximize energy savings in local buildings should focus both on enabling building owners and operators to pick all the “low hanging fruit” short-term payback measures, as well as to pursue longer-term measures. What is more, by bundling projects together, owners and operators can realize increased savings compared with individual measures.

Economic Benefits of Effective Energy Efficiency

An effective energy efficiency strategy generates numerous benefits that accrue to building owners, and to employees, residents and the

entire region. These include financial returns that affect businesses’ bottom lines, increased local investment that expands economic activity, and health and environmental improvements.

Enhanced Business Profitability

Reducing operating costs by lowering energy spending realizes greater profits for businesses. Energy and other utility services comprise the largest non-labor operating costs for buildings in most regions of the US. For example, energy and water account for 22% of office owners’ operating expenses, equating to about \$2.25 per square foot.¹⁰ The effect on businesses’ net profits can be especially large for businesses with low profit margins, and for whom energy costs make up a large percentage of their operating costs, such as food processing, manufacturing, and hotels. Even for the average business, the EPA estimates that a 10% reduction in energy costs

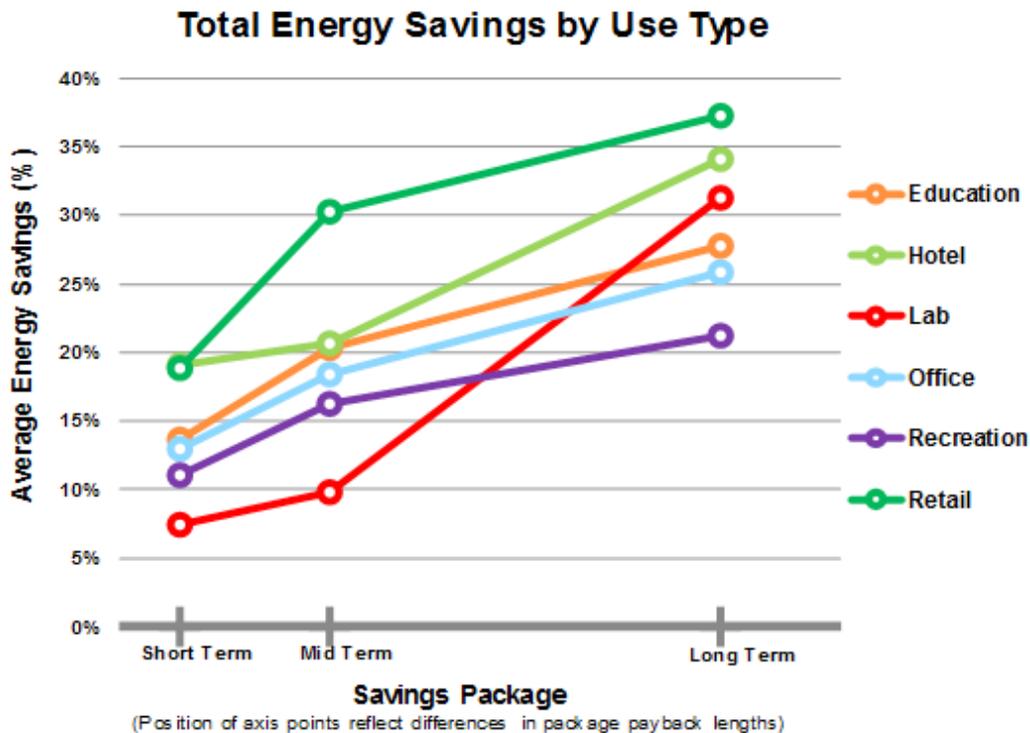


Figure 2: Potential savings by property use from multiple efficiency measures. SOURCE: Retroficiency¹¹

could translate to a 1.5% increase in net operating income.¹² By aiding local businesses in energy management activities, local and regional economic development organizations enhance their profitability and financial security.

Local Economic Vitality and Job Creation

Energy management increases investment and employment in local economies. Energy efficiency projects produce economic activity and a net increase in jobs by two means: (1) direct investment in energy management (“investment related jobs”); and (2) through the induced reinvestment or spending of energy savings (“savings related jobs”).¹³ Most dollars spent on energy typically flow outside a region while a higher share of energy management investment dollars are spent locally. Local impacts are even greater for energy savings since a large share of these savings are spent locally. As a result, the “savings related” economic and job impacts are quite large, although they vary from region to region.

Improved Real Estate Values

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 analysis of national studies on the impact of LEED and ENERGY STAR ratings on real estate performance found consistently positive premiums on rents, sales price, and occupancy (see Figure 3). Although multiple building features contribute to these ratings, energy management is a key component. Increased property values can also contribute to lower tax rates and a stronger and more stable government finances since property taxes are a major source of local government revenue.

Health and Productivity Improvements

Building energy upgrades also contribute to health and productivity improvements for employees. Studies suggest that energy efficient building features and good energy management practices contribute to improved worker performance and health. These studies have shown that features such as temperature control, improved indoor air quality, lighting system quality, and access to the natural environment can reduce buildings’ energy use and improve the performance of employees working in those buildings. Additionally, energy management upgrades may improve indoor air quality and reduce employee sick

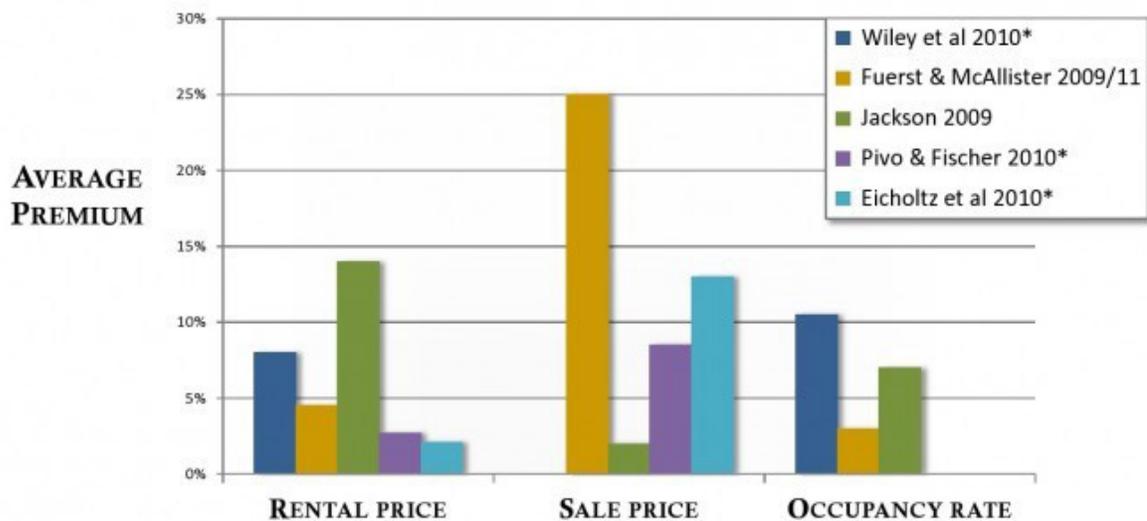


Figure 3: The premium associated with green rated commercial real estate from multiple studies. Source: Institute for Market Transformation.¹⁴

time. These health and productivity benefits increase the financial case for energy management. Employee and labor costs typically exceed the costs of space for firms. Therefore, small improvements to occupants' health and productivity from energy management initiatives significantly affect businesses' bottom lines.

Growing a Local Cluster

Many regions have clusters of firms supplying efficiency goods and services that can be exported to generate local business and income growth. As global markets for energy services grow, regions that best cultivate their energy management sector stand to capture more of this market potential. Regions with strong energy management clusters are often early adopters of strong energy efficiency policy for buildings, as strong and sophisticated demand for these products and services stimulates a larger and more competitive regional industry cluster. MIT GEDI's interviews with energy service firms suggest that they benefit from local regulations and programs that support their service markets. Subsequently, these firms build markets outside of their region by leveraging the expertise, technology and reputations they gained in responding to early local demand. This is especially pertinent for regions with large metropolitan areas where design and engineering services tend to cluster. By retooling business development work, local governments and organizations can support the growth and competitiveness of energy management clusters.

Several regions and organizations have recognized this potential and have pursued strategies or policy initiatives for growing strong regional clean energy and energy management industry clusters. The New England Clean Energy Council (NECEC) is a trade organization that represents hundreds of clean energy companies across New England and is a key stakeholder in energy policy and market transformation.¹⁵ A similar organization in Austin, TX is sponsored by the Greater Austin Chamber of Commerce.¹⁶ They

contracted with a private partner to evaluate the energy economy in the region and create specific targets to grow jobs and investment in clean energy. A third example is the Greater Phoenix Economic Council's coordinated campaign to establish tax credits, financing, and build capacity at local universities to become one of the leading states for solar production and manufacturing.¹⁷

Cluster development not only requires investment in industry but in people as well. Workforce development organizations play a key role in ensuring that a well-trained workforce exists for people with a variety of skills and income benefits. An energy efficiency cluster can only develop and grow with a workforce with the appropriate skills for the operation of equipment and on-going maintenance of installations.

Contributing to Mitigating Environmental Damage

When local governments support innovation and adoption of clean energy, they collectively mitigate environmental impacts. Cumulatively, cities could have a significant impact on climate change by implementing an energy efficiency transformation program. As climate change continues to contribute to extreme weather events, reducing energy impact and carbon emissions helps to both mitigate impacts and build resiliency in communities. The Environmental Protection Agency cites that energy use in homes, buildings, and industry account for two thirds of greenhouse gas emissions. In 2012 alone, 242 million metric tons of greenhouse gas emissions were saved by the ENERGY STAR program to reduce damages from climate change, representing close to 4% of U.S. total greenhouse gas emissions that year.¹⁸

Barriers to Energy Efficiency

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If markets worked perfectly, building owners and operators would already have captured the value from all potential energy efficiency opportunities. Instead, a variety of well-documented property and market barriers hinder uptake of energy efficiency measures. Governments, in partnership with other local stakeholders, play an important role in addressing these barriers.

See Appendix B for a more detailed discussion of the barriers to energy efficiency.

Property Level Barriers

Imperfect Information and Capacity

Many property owners, managers and building operators lack information about energy efficiency technologies or upgrades. Staff may not be trained in current or necessary methods. Similarly, they have difficulty finding and vetting effective contractors for audits, upgrades, and installation.

Budgeting Challenges and “Hold Barriers”

Facilities staff may have to coordinate with senior financial management for any projects beyond a 1-2 year payback and beyond the scope of their current operating budget. Senior financial managers have limited time to focus on energy management and facilities management staff may lack the financial literacy to present a compelling case to senior management for upgrades. Additionally, many building owners face “hold barriers” which make them hesitant to invest in longer

payback efficiency measures when they may sell the building at some point in the future. Many MIT GEDI interviewees cited this hold barrier as perhaps the greatest impediment to deep energy upgrade projects.

Split Incentives

Investments in energy efficiency in many buildings are stymied by split-incentives: owners are expected to finance and make payments for energy services for the property, but tenants reap the benefits of lower utility bills. The nature of the split-incentive problem varies with the different leases used in commercial real estate. In the cases of triple net leases and modified gross leases, energy project financing can be more readily realized if the costs of projects can be readily passed through to tenants under existing lease terms. Alternately, efforts can be made to establish “green leases” with tenants and have tenants adopt (some of) the incremental costs of upgrades.

Perceived Need for Off-balance Sheet Financing

Many properties, particularly LLCs that own individual properties as investments, are highly leveraged, with little capacity to take on additional debt. Moreover, most mortgage covenants prohibit commercial building owners from assuming other debt, or liens on their property or equipment, without mortgage lenders permission. For these reasons, many commercial properties desire “off-balance” sheet financing options, which do not appear on firms’ balance sheets as debt.

Market Level Barriers

Workforce Skills Gaps

As demand for energy efficiency grows, regions need a specific skilled workforce to install, maintain, and develop technologies in the industry. Without sufficient workforce development programs and organization capacity, regions fail to effectively meet demand. Similarly, if consumers find the quality of service and installation lacking, they will be less likely to pursue environmental goals. MIT GEDI's interviews with energy management firms suggested a shortage of qualified and experienced workers impedes the expansion of some energy efficiency markets. They specifically cited that retiring senior staff and a shortage of new engineers and technicians with sufficient energy management skills and experience make business and industry growth more difficult.¹⁹

Utility and Regulator Buy-in

Utilities frequently play a central role in marketing and administering energy efficiency programs and brokering projects to be financed. However, many states' legislation and utility regulations do not reward utilities for facilitating the adoption of all available energy efficiency resources.²⁰ Indeed, the utility industry has voiced concern that its business model could be threatened by the growing adoption of efficiency and distributed generation, which reduce their revenue and limit opportunities for long-term expansion.²¹ Innovative new utility business models and regulatory regimes are necessary to align utility incentives with energy management market transformation.

Contractors and ESCOs Market Gap

Contractors and ESCOs may not serve certain customer segments (small businesses, for example) if transaction costs are too high. Improving businesses' knowledge of energy efficiency, providing financing mecha-

nisms, etc. could reduce transaction costs and increase program uptake. Additionally, creating programs that support contractor attention to small business may also assist in expanding energy efficiency investment.

Lack of Project Financing

In many regions, financing markets for energy upgrades projects have been slow to materialize. Energy efficiency requires certain types of financing that tend to be longer term. They also need to be tied to the property where improvements are made, not to the current owner, making it difficult to monitor over the life of the financing.

Need for "Market Transformation"

Market transformation refers to strategic interventions that can bring about lasting change in markets for energy efficiency and other energy management activity, speeding their adoption. These include efforts to reduce barriers to energy management, and realize more perfectly functioning markets by providing better quality information; reducing transaction costs; facilitating access to capital; and aligning structural incentives so that building owners, managers and tenants all have an interest in pursuing cost-effective energy management. Many different actors assist with market transformation initiatives, including state and federal government, local government, utility rate-payer funded programs, non-profits, industry groups, and others. Local government can play an important role in these efforts, especially by thinking regionally. Markets for energy efficiency, like other markets, are not limited to a particular jurisdiction, but reflect the regional economy. Efforts are more effective at a regional scale and local governments should aim to scale them up. The next section discusses how local governments can review their regional market to conduct an industry analysis and formulate a strategy for energy efficiency market transformation.

Energy Efficiency Industry Analysis and Strategy Formulation

Introduction

Developing an effective energy management market transformation strategy requires a thorough understanding of regional markets for energy services. This includes knowledge of the demand among businesses and property owners; the firms, contractors and workforce that provide these services; and the existing programs and initiatives that support the sector. To gain this understanding, GEDI developed an approach for local governments to undertake an “Industry Analysis” of the energy management space in their region. This industry analysis methodology broadly follows the market research protocol described in Michael Porter’s *Competitive Strategy: Techniques for Analyzing Industries and Competitors*.²² The Industry Analysis incorporates four elements:

1. An analysis that addresses the nature of and barriers to demand for energy efficiency (demand side).
2. Research into the firms that deliver energy efficiency services (supply side).
3. Review and assessment of existing energy efficiency policies and programs.
4. Review and assessment of workforce development/education programs targeted to skills and occupations in energy management.

The key information sources and research steps for the analysis include:

- A review of existing publications on the energy efficiency potential of commercial buildings in your region; the local real estate market; the economic development potential and needs of the energy sector; local energy sector workforce, and workforce development needs.
- Identifying existing regional energy efficiency programs that include energy efficiency financing programs; economic development initiatives; workforce development initiatives; energy management certifications offered by community colleges and other educational institutions.
- Understanding local, state and national policy and programs around energy, green economic development, and any benchmarking or energy-related ordinances.
- Interviews with participants in the commercial real estate and commercial energy services sector including energy service providers, contractors and engineering firms; real estate organizations representing building owners, developers and managers; individual property owners and managers; workforce development organizations; community college energy management faculty; and government staff.
- Surveys or interviews with local energy efficiency construction, engineering and service firms, commercial property managers and building owners.

Several tools for conducting this industry analysis, including a workbook to organize information, sample surveys and interview questions are available on the GEDI Energy Efficiency Market Transformation [website](#).

Demand Side Analysis: Identifying Key Barriers and Opportunities

Real Estate Market Conditions

The demand side analysis begins with analyzing the current real estate market conditions and recent trends.

Building Types: What are the primary building types and sectors in the region? You may choose to focus on a dominant sector or a few sectors that offer significant energy savings potential. Potential building types to address are class A office buildings, class B and C office buildings, industrial properties, shopping centers and retail properties and large institutional uses such as universities and hospitals.

Magnitude and Size of Property Classes: It is important to identify the magnitude of square footage for different property types or size classes and which of these property types account for the highest energy use? You might notice that different building types cluster in specific areas of the region, which could affect how you deploy interventions and programs.

Building Financial Performance: What are the profit margins and vacancy rates for different property or use types? High vacancy rates and/or low margins may limit owners and operators' capacity to invest in improvements with their own resources and their likelihood of pursuing energy management/financing, unless they can defer repayment.

* <http://web.mit.edu/CoLab/gedi/capacity-energy-efficiency-market-transformation-strategy.html>

Identify: key property types, uses or regional clusters to target for local initiatives that provide the desired benefits.

Building Owners and Operator Perspective

Speak with local building owners and managers across a variety of building types and industries and representing different size firms and organizations. A key to understanding demand is to understand what energy efficiency activities currently exist in your region, what type of properties and owners are and are not implementing energy efficiency measures and the primary barriers to greater investment in and attention to energy management. See GEDI's [sample building owners and managers survey](#) to guide you in collecting this information.[†] Key issues to address are:

Existing Projects: What energy efficiency improvements have owners completed to-date? How have they been financed?

Monitoring and Maintenance: Owners can provide information on what measurement and verification tools they use to monitor building operations. What services do they contract out for, and which ones do they perform in-house?

Networks and Local Standards: What networks already exist for energy efficiency activities? Find out what industry organizations are popular and what training programs or certifications building owners and managers look for when hiring staff. Which building certifications and energy use benchmarking tools are used most (or least) in the region?

Perceived Barriers: Building owners and operators can provide valuable information about what they perceive and face as barriers to energy efficiency improvements, and what the local government can do to reduce these

† http://web.mit.edu/colab/gedi/pdf/eemts/Guidebook_Resources-Sample Owner Manager Survey.pdf

barriers and support expanded uptake of efficiency measures.

Identify: building owners and operators' current adoption of energy efficiency practices and their view on barriers to increased deployment.

fields, and what type of services and activities do they undertake? A [sample firm survey](#) can be found on the GEDI web site.*

Industry Scope: Understand the building types served, how contracts are structured, and if there are project size thresholds below which they will not engage clients. These firms will be a good source of information on what obstacles they see for clients in undertaking energy efficiency services.

Supply Side Analysis: Energy Efficiency Industry Structure, Competitive Strengths and Business Capacity

Energy Service Providers

Survey energy service providers in the region to provide significant details about the supply-side of your energy efficiency industry, its strengths, and its opportunities. Energy service providers represent firms that do work in energy management. They include:

- Engineering firms
- Mechanical, electrical or controls contractors
- Energy services companies (ESCO)
- Commissioning and retro-commissioning firms and energy auditors
- Energy modeling companies
- Energy software development firms
- Testing, adjusting, and balancing firms

Workforce Needs: You can also identify what training, experience and credentials (if any) they find important for staff to have, what hiring and workforce training challenges they face, how they recruit new employees and their use (if any) of existing training and workforce development programs.

Regional Strengths: Explore existing and potential regional strengths that provide a basis for exportable energy management services and products to compete in national and international markets. These include special university, government or industry R&D capabilities, headquarters or research centers for leading firms in energy management, or a concentration of small innovative firms developing new energy management products and services.

Identify: key industry needs, weaknesses and strengths; opportunities to grow, diversify and strengthen the industry and supporting infrastructure; policy and program priorities to address key needs and opportunities; and allies for policy changes and program implementation.

Industry Size and Organization: Begin by getting a sense of the size of this industry in your region. How many firms exist, how big are they, and what revenues do they generate specifically in building energy efficiency? Many firms will offer an array of services, and it will be important to separate out their work specifically in energy efficiency. Are there industry and professional associations that support and promote the energy efficiency sector or related

* [web.mit.edu/colab/gedi/pdf/eemts/Guidebook_Resources-Sample Energy Efficiency Firm Survey.pdf](http://web.mit.edu/colab/gedi/pdf/eemts/Guidebook_Resources-Sample_Energy_Efficiency_Firm_Survey.pdf).

Financing Mechanisms

A large portion of an effective supply-side market for energy efficiency is access to capital for energy efficient projects and upgrades.

Financing Sources: What finance sources and mechanisms currently exist in the region via private banks, utilities, Community Development Financial Institutions (CDFIs) and government? Are they widely available and do firms and building owners understand their options? Which ones are most widely used and do they vary by property size, type or use?

Financing Gaps: Owners of different building types will face a variety of financing gaps while others may not be constrained financially at all. Recognizing what property types are well served by existing financing mechanisms for energy efficiency, and what types face financing “gaps”, will help the region better respond to future needs.

Identify: financing gaps for energy management investments; active lenders in the market; development finance opportunities and barriers; policies, institutional mechanisms, and partners to address gaps.

Existing Policy and Programs

Your region may already have policies and programs to support building energy efficiency that provide the foundation for a market transformation strategy.

Program Inventory: Identify how comprehensive these policies and programs are and what building types they serve. Are there any utility ratepayer-funded programs, government, or non-profit programs that are particularly effective?

Program Effectiveness: What policies and programs are working well and should be

expanded? Are there problems, gaps or limitations in existing efforts that hamper their effectiveness? What do participants find lacking in these programs? Are they widely known? Many MIT GEDI interviewees cited lack of public knowledge and awareness for existing programs. Are there other barriers to participation? Additional barriers may include lack of time, mistrust of program providers, difficulty in navigating requirements or lack of complementary financing instruments.

Identify: how your local government can complement and improve programs with collaborative initiatives, marketing, or financing mechanisms; expansion of existing initiatives; and new policies and programs to build market demand and address supply gaps.

Workforce Development Programs

It is important for property managers and building operators to possess sufficient skills to conduct energy management, and that highly skilled energy service professionals and contractors are available locally. Local governments are well positioned to support workforce development in the energy management industry. This research will help to formulate an effective local government strategy for energy efficiency workforce development.

Existing Programs: Identify existing energy management training programs in the region and what specific jobs, occupations and skill sets are targeted. What gaps and constraints exist in the region’s workforce development sector? These may include a lack of sufficient participation in programs, limited funds that constrain offerings, oversubscribed programs, skill or occupational needs not being addressed, mismatches between firms needs and training curricula or difficulty finding instructors with expertise.

Role of Credentials: Research the way credentials and certifications are perceived in the marketplace. Are they valued by building owners as well as energy service provider firms? Which ones are most highly valued and are these addressed in existing education and training programs?

Identify: existing training programs, challenges, and perceptions in the region; skills and knowledge needs not being addressed; gaps in occupations and/or types of workers served, key credentials and certifications to promote; partnerships for more effective programs.

Creating the Market Transformation Agenda and Strategy

Once the industry analysis is completed, you are ready to set the market transformation agenda and strategy. This critical step in the process involves synthesizing information from the industry analysis to complete three tasks:

1. Setting appropriate goals and demand side targets.
2. Defining the critical demand and supply barriers to broaden adoption of energy management investments and the key regional assets and partners to leverage in addressing these barriers and strengthening the energy management supply system.
3. Formulating specific policies, initiatives and actions that combine to achieve the strategy's intermediate and long-term goals.

Once you have formulated the preliminary agenda and strategy proposals, they need to be tested with key stakeholders to ensure support and buy-in exists to move forward and implement the agenda. After buy-in is established, a more detailed implementation plan

for the market transformation strategy can be formulated. This process is often an iterative one in which goals and strategies are refined and adjusted as support is tested and feedback is received from different partners and stakeholders.

Setting Goals and Targets

A key first step is setting clear goals for the strategy and the appropriate targets to achieve these goals. As noted earlier, potential goals for a commercial energy management strategy include:

- Reduced building energy use and carbon emissions
- Recognition and branding of a region, city or district as sustainable or energy efficient place
- Improving business competitiveness through lower energy use and more efficient operations
- Development and growth of a competitive industry or business cluster
- Expanded employment via increased investment and growth of the energy management sector
- Increasing job opportunities for unemployed, less skilled or lower income workers

Agenda setting requires choosing goals that are priorities for local stakeholders and feasible given the current conditions and resources uncovered in the industry analysis. Consequently, the industry analysis must reveal market conditions that provide an opportunity to achieve the goal and indicate the resources to provide a feasible pathway to achieve the goals; this is especially important for cluster development and employment goals.

To develop and grow a competitive energy management cluster, the industry analysis should show the presence of (a) a concentration of existing firms exporting services

and products outside the region; (b) firms or entrepreneurs developing new products and services with a sizeable market and that promise advantages over existing products or services; and (c) specialized and deep research and development capacity related to energy efficiency and energy management, ideally related to the focus of existing or emerging firms .

A goal of increasing jobs for low-skill workers requires evidence that sustained demand exists among local property owners, property managers and/or firms providing energy efficiency services for new workers with specific skills and in occupations beyond that found in the regional labor market. To address this labor demand, the capacity to design and deliver required training and a pool of targeted workers with entry qualifications for training (or who can readily meet these requirements) also must exist.

A related part of strategy formulation is defining the property type and/or industry targets to expand local demand. In addition to alignment with your goals, considerations in setting these targets include:

- Property types and industries that are intensive energy users and/or account for a large share of the city's building energy consumption
- Uses or industries that are lagging in adoption of energy efficiency measures
- Geographic or ownership concentration that facilitate adoption
- Existing resources, such as leadership, organization, expertise, or funding, that are targeted to or can be readily deployed to address the property type or industry.

Defining key barriers and partners

Effective market transformation strategies need to address the central barriers to

achieving significant market adoption of energy efficiency upgrades and management practices on both the demand and supply sides. The industry analysis is likely to identify multiple barriers, but it may neither be feasible nor equally important to address all of them. It is necessary to address barriers strategically, defining ones with the greatest potential to generate substantial investment and action within the targeted areas and where the resources and capacity to address them can be mobilized. Several considerations in defining key barriers on both the demand and supply side include:

Demand Side Considerations

- Is there agreement on the most common and important barriers across building owners, building managers and energy service firms?
- If consensus does not exist, what other evidence indicates the most significant barriers?
- Do barriers vary by property characteristics such as type, size, ownership and how do these differences align with the strategy targets or require tackling different barriers for different targets?
- Are barriers to energy efficiency investments different than the ones related to on-going energy management? What is needed to address both activities?
- What barriers are being addressed by existing policies and initiatives and how effective are these efforts?

Supply Side Considerations

- Are there commonalities or agreement on the barriers that firms face in responding to the demand in the regional market? In expanding into new markets and property types?
- Does the industry include many small or early stage firms, which face more barriers to accessing resources than large and established firms?

- Are important regional research and development centers and capacities working with and connected to area energy service firms?
- Do associations, events and venues exist for learning, opportunity exploration and collaboration among energy services firm and with those in related or supporting industries? Are they well used and effective?
- How significant are workforce development needs to firms in the industry? How closely do existing education institutions and programs work with industry to address these needs? How effective are these efforts to meeting both industry and worker needs?
- What barriers are being addressed by existing policies and initiatives and how effective are these efforts?

Strategy formulation also requires identifying appropriate partners to work with the local government, property owners, and industry to implementing the strategy. Partners will likely include a combination of industry and professional associations, energy utilities, economic and business development organization and universities, other educational institutions and workforce development agencies. Key factors in choosing and cultivating the most effective partners include:

- The depth and breadth of their relationships and trust with the targeted properties on the demand side and target firms and workers on supply side.
- How well their mission and interests are aligned with advancing the strategy.
- Their resources, expertise and capacity to implement key activities required under the strategy.
- The strength and commitment of the agency leadership and key staff to the strategy's goals and their component activities.

Many of these partners will be known or identified early in the industry analysis. Interviews and meetings with them will help determine their alignment, interest and capacity to be an effective partner.

Formulating Initiatives

The final step is designing, in broad terms, the policies, initiatives and activities that are expected to address key barriers and opportunities and achieve your market transformation goals. The next section outlines the key tools that constitute the building blocks of local energy management market transformation strategies. Selecting the most appropriate and effective tools is partly driven by the goals, targets and barriers identified earlier in the strategy formulation process: they must be targeted at, and effective in, overcoming these specific obstacles and generating the desired actions upon the strategy is based. A second factor involves judgments about the ability to mobilize the required resources for different initiatives. These resources may range from political support to enact a new law to buy-in of key partners with essential capacities or funding needed to hire staff or add new services or financial capital for incentive or lending programs. One way to test and refine the design of this aspect of strategy formulation is to create "strategy pathway map" the links the chosen policies and initiatives to the strategy's goals and barriers—this pathway shows (1) how these efforts will overcome specific barriers and result in the intended actions; (2) how these actions lead to intermediate results or outcomes; and (3) the relationship and means through which these intermediate results lead to the strategy's ultimate goals, including additional initiatives or actions that may be necessary. This pathway map is a useful way to test the logic and plausibility of the overall strategy and its specific initiatives.

Roles and Effective Tools for Local Government and Others in Energy Market Transformation

Once the industry analysis is completed and the market transformation agenda defined, your agency can begin thinking about its role in implementing the energy market transformation strategy. The following ideas highlight common roles for local governments in energy efficiency efforts and provide useful examples of how local governments are putting these ideas into practice.

Support Energy Management Promotions and Outreach

One key way for local governments to grow their region's energy market is through sustained efforts to motivate and support increased commitment and demand for energy efficiency investments. This can entail providing information and technical support, organizing competitions or energy challenges, advancing deployment of new technologies and leading by example in existing public buildings.

Technical Assistance

Regions can create a clearinghouse for information on the latest technologies, potential vendors, and the most up-to-date tools. This could be through online resources, trainings, and convening of relevant stakeholders. For example, Thinc.Green²³ is a regional collaborative initiative between the municipal governments of Minneapolis and St. Paul, dedicated to the development of the region's green economy by expanding

local markets for green products and services, branding the Minneapolis-St. Paul region as an ideal destination for green businesses and manufacturing, and constructing a friendly environment for green businesses. Thinc.Green has established a Green Building Sub-committee, which includes representatives from multiple stakeholders in the region, including real estate firms, government agencies, and utilities. This sub-committee is engaged in ongoing efforts to develop green building policy and industry initiatives.

Similarly, your agency can facilitate training for building owners to use Energy Star Portfolio Manager or other building performance tracking tools. These tools help benchmark a property's energy against other properties and efficient energy use metrics to identify properties and systems where large energy efficiency gains can be achieved. This service is especially helpful in smaller properties, where managers may not have experience with these tools and will need assistance in properly setting up a building energy tracking system. This could include in-person trainings, webinars or a hotline.

Another example of technical assistance is a green lease coaching workshop. Green lease terms align building owners' and tenants' interests in saving building energy. The initiative should guide teams of owners, key tenants, real estate brokers, and others through green lease terms for different types of leases.

Energy Challenges

Challenges are a great way to create a positive competitive atmosphere around energy efficiency. An energy efficiency challenge is one of the most effective ways to cultivate broad participation in energy efficiency improvements that cover a large share of the commercial floor space in a region. Moreover, energy challenges build private sector leadership and norms for energy efficiency and a platform for peer learning. Local governments can sponsor or co-sponsor a full-blown energy challenge, promote awareness of challenges organized by the private sector or industry associations, and provide recognition for the accomplishments and award winners from these challenges. Once the challenge is completed, local officials and agencies can celebrate success with public promotions via signage, awards, websites, press releases, etc. for projects that achieved the greatest efficiency gains and implemented innovative or extensive energy efficiency measures.

The Eastside Sustainable Business Alliance in Bellevue, Washington hosted a Green Business Challenge in 2012, which engaged and helped regional businesses achieve \$1.9 million in annual energy savings. Another example is the Chicago Green Office Challenge, co-developed and implemented by city staff, the non-profit ICLEI (Local Governments for Sustainability), and Office Depot. In 2011 alone, participants saved over 124 million-kilowatt hours and more than 85,000 metric tons of carbon emissions.²⁴ The Challenge provides a web tool, the Green per Square Foot platform, that helps building owners and managers find energy and money-saving opportunities in reducing waste, energy, and water and connects users with energy retrofit service providers. It also includes an e-procurement system that matches customers with the services they need and emphasizes cost savings and transparency.

Your local government should capitalize on existing energy competitions and challenges. In many cities and regions, local chapters of national real estate and facility management associations sponsor energy challenges and

award programs. For example, in New Jersey, the local chapter of the Building Owners and Managers Association (BOMA) holds an annual Kilowatt Crackdown program, providing friendly competition between their membership to reduce energy use, through awards and seminars. Likewise, New Jersey's chapter of International Facility Management Association (IFMA) distributes energy awards each year. Government officials can endorse, promote and support these programs, attend award ceremonies, provide their own recognition of winners and help spread the word about these existing competitions.

Appendix C provides additional information on best practices in organizing energy challenges.

Facilitating Deployment of Innovative Technologies

Creating a living laboratory to support and showcase the most effective technologies can help accelerate and deploy energy management innovations in the region. The Northwest Building Energy Technology Hub (NBETH) in Washington is a statewide testing and demonstration center for building energy technology development and commercial acceleration. Funded by the i6 Green Challenge Grant from the U.S. EPA and U.S. DOE, and co-managed by seven partners,²⁵ NBETH plans to create a network of technology innovators, investors, industries, and policymakers in the Pacific Northwest to facilitate the exchange of ideas, resources, and information about market and funding opportunities. While not all cities and regions may be able to create this type of dedicated facility, they can use other means to test, display, and expand deployment of innovative technologies. Options include providing demonstration grants to install and test innovative technologies, organizing meetings, conferences and networking events to share information on new and emerging technologies, publicizing their use and benefits, and as elaborated below, using public buildings to demonstrate and highlight new technologies.

Lead by Example

Local government buildings often make up a small percentage of total energy use, but they include high profile places to create demonstration projects and work on energy efficiency initiatives. Government buildings tend to have longer periods of ownership and dedicated facilities staff making it easier to work on long-term improvements. Government efforts can kick-start demand for services by being “early adopters” of technology. These efforts can also result in valuable cost savings for tight local government budgets. In Bellevue, Washington City Hall, staff successfully saved 34.1% in annual energy savings over five years with savings topping \$350,000 in the first three years. Not only has the city saved money and energy, but they have also successfully shared their success with the community through media and other forums.

Influence Local Regulatory Measures

In addition to championing voluntary energy management, cities and local governments can have even greater impact through setting standards and regulations that bring stakeholders throughout the region into the process. These tools are an important part of any market transformation strategy.

Energy Disclosure and Benchmarking

Disclosure and benchmarking policies require that commercial buildings above a certain size threshold annually report their energy use to their local/state government with this information often disclosed publicly. Such policies are intended to increase market transparency, allowing prospective occupants to better understand energy use and making owners more aware of their buildings’ relative performance to other buildings. More than a dozen cities and states have adopted benchmarking and disclosure policies to-date. The [Building Data website](#) provides more information

about each of them.*

Mandatory Energy Assessments & Upgrades

Some local governments have policies that require commercial buildings to undergo an assessment of energy savings opportunities. Assessments could include an ASHRAE audit or a retro-commissioning study. ASHRAE (the American Society of Heating, Refrigerating and Air-Conditioning Engineers) has created standardized audits at three levels to screen for energy improvements and optimization in existing buildings. An audit focuses primarily on measures for energy efficiency improvement such as upgrades and retrofits. Retro-commissioning, also focused on existing buildings, applies primarily to optimizing building operations and maintenance. Assessments may be required either by some date/time interval, or at some point in the buildings’ life cycle (building sale, tenant turnover, etc.). Austin, New York, San Francisco and Boston all require commercial buildings to undergo assessments of energy efficiency potential.

Additionally, many cities are 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.

Adopting Performance Targets in Building Codes

Another way to regulate building performance is by setting targets directly in building codes. These standards can be implemented gradually or for certain building types initially. For example, the Minnesota Sustainable Building 2030 (SB 2030) program developed standards for sustainable building practices in all state buildings.²⁶ Others may join SB 2030 on a voluntary basis. The team is also developing standards for commissioning new and existing

* <http://www.buildingrating.org/content/us-policy-briefs>

buildings. Cities are also requiring performance targets around energy efficiency. New York City mandates that all new building projects and alterations must comply with the New York City Energy Conservation Code (NYCECC), which is part of the City's efforts to reduce greenhouse gas emissions by 30% by 2030.²⁷

Create an Enabling Environment for Energy Efficiency

Another important role for local governments is to become a key partner in advocating for energy efficiency across the region and building capacity for market transformation.

Set Community-Wide Targets

Many of the most successful business engagement programs and initiatives have clear, measurable targets as a cornerstone of their program. Local governments can be a leader in a network of advocates to set targets and help the region achieve them. These targets motivate widespread action and push government and business leaders to develop specific strategies, policies and initiatives to reach their goals. Examples of community or area wide energy efficiency targets include: Seattle's 2030 District's goal of 50% reduction in energy use by 2030; Envision Charlotte's target of a 20% reduction in energy use in five years; and Puget Sound Energy's Resource Conservation Manager Program which seeks to reduce clients' utility costs by 15-20% through the program. The Alliance to Save Energy encourages local and state government to adopt goals of doubling energy productivity in their communities by 2030.

Facilitate Clean Energy & Energy Efficiency Finance

As part of its business engagement, the region can facilitate seminars, individual advising, and

other opportunities to educate more building owners and property managers about available financing options. Additionally, local governments should ensure that resources and information about all available financing mechanisms are provided on government websites and in other media.

In conjunction with other partners, such as business associations and local universities, conduct focus groups to assess the need for an energy management boot camp for financial decision-makers. See the GEDI website for a [sample focus group outline](#).*

The boot camp would outline the importance of strong ongoing operations management, as well as introduce decision-makers to energy upgrade financing tools.

Finally, consider how to tweak existing development finance programs to facilitate the adoption of unique energy project finance mechanisms.

MIT GEDI published a paper with the Institute for Market Transformation, "Local Governments' Role in Energy Project Financing," which outlines policies and tools for how local governments can facilitate the financing of energy efficiency in commercial buildings.

Support a Regulatory Structure that Aligns Utility Business Models with Energy Sustainability

As it engages in market transformation initiatives, the City should investigate utilities' incentives to invest in greater market transformation activity, and convene stakeholders to address potential barriers. Many utilities have energy efficiency targets, which entail reporting to regulators at a state level on particular investments that lead to discrete energy savings outcomes. Thus, utilities have little incentive to engage in activities

* http://web.mit.edu/colab/gedi/pdf/eemts/Guidebook_Resources-Sample Focus Group Questions.pdf.

that would permanently change the structure of energy service markets. Utilities are not directly nor substantially rewarded for educating consumers, reducing split-incentives, training a more skilled workforce, or other market transformation initiatives. Your local government could take on convening stakeholders to address this problem. Ultimately, any efforts to improve utility regulation will involve extensive engagement to impact state legislation and the appropriate public utilities commission regulation of energy efficiency programs. Consider establishing a multi-stakeholder group, comprised of local government, industry, and non-profit advocates, to engage in these forums.

Broaden Community and Economic Development Impacts

Support Clean Energy Business and Economic Development

The region should support energy efficiency startups and entrepreneurship with the region's existing economic development networks. Consider connecting local entrepreneurs with financial and technical assistance resources offered by business organization partners. Major financial and technical support resources include applicable tax incentives, loans provided by nonconventional lenders, and access to local technical assistance centers. Although many financial, technical and network resources foster an environment that is favorable to entrepreneurs, there may not be any that are specifically geared toward energy efficiency-related industries. Efforts should be taken to proactively align energy efficiency entrepreneurs and businesses with these resources. The region could also establish an entrepreneur network to foster peer learning and support among firms.

This reorientation process should ensure a focus on supporting whole sectors and

connecting with local energy service firms to identify their needs. Ascertain where standardization may improve the industry (e.g. existing bids on commissioning contracts vary substantially and lead to industry confusion). Also consider how a region's energy efficiency sector can export its services to other areas. In Portland, the "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 building, waste recycling, investment and financing, and 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.

Support Workforce Development

Identify and document existing workforce development programs that provide training in energy management techniques and pathways into energy management-related careers. Make this information publicly available and widely disseminate it in the region. Work with your state workforce system and any local Workforce Investment Boards to ensure that workforce development needs of energy management sector are evaluated and resources and training for appropriate credentials are available. If there is a need for new programs, your local government can work with providers to develop training for workforce development.

The impact of investing in the energy management skills of various positions (building operator, engineers, contractors, etc.) could be substantial; our interviews and calculations suggest that in many cities a majority of building operators and managers have not received formal energy management training and could benefit significantly from such educational opportunities.

Link Opportunities to Economic Inclusion

Expanding energy efficiency activities in your region can be an important way to link low-income workers to training opportunities, expand Minority and Women-owned Business Enterprise (MWBE) participation, and reduce barriers to participation by smaller properties and businesses. Economic equity is important to a region's long-term wealth and shared prosperity.

Implementing a Market Transformation Strategy

Once the industry analysis is completed and the market transformation strategy formulated, the focus shifts to strategy implementation. This process requires involving and coordinating the work of many partners and even expanding the team of active stakeholders working to advance the strategy. Several key steps and tools to support successful strategy implementation include:

- Providing a short summary of the Industry Analysis findings and how the strategy responds to these findings so that other decision-makers and potential partners understand current market conditions and the market transformation strategy.
- Establishing a multi-stakeholder steering committee to coordinate strategy implementation and adapt the strategy overtime. This steering committee can be linked to specific

work groups focused in implementation in key areas, e.g. outreach and marketing, finance, workforce development, cluster development, etc.

- Creating a detailed action plan with major tasks, implementation parties and initial periods to guide implementation efforts, stage initiatives according to priorities and resources, and track progress. The action plan can be reviewed and adjusted periodically, e.g. every six months, to address learning during implementation and opportunities or priorities in response to new policies and changed conditions.

The next few pages provide an example of a high level implementation timeline for an overall strategy with two project- specific project timelines.

Sample Overview of Major Activities (not exhaustive)

Strategy Component/ Activity	Projects	Timeline	Key Parties
Overall Strategy Leadership			
Convene stakeholders for community wide targets	Create a committee to explore appropriate targets and how to reach them	Medium - Long Term	<ul style="list-style-type: none"> • Public Agency • Business Leaders/Associations • Economic Development Organizations • Building Owners • Non-profit Organizations • Contractors & Firms
Address Demand Side Barriers and Opportunities			
Publicize internal successes with energy management	Press releases	Short Term	<ul style="list-style-type: none"> • Public Agency
	Public energy monitoring dashboards	Short Term	<ul style="list-style-type: none"> • Public Agency • Controls Contractor
Engage property and business owners	Host a business energy challenge	Short Term	<ul style="list-style-type: none"> • Public Agency • Business Leaders/Associations • Building Owners
Address Supply Side Barriers and Opportunities			
Expand energy service provider capacity	Establish a technical support program	Medium Term	<ul style="list-style-type: none"> • Public Agency • Economic Development Organizations • Contractors & Firms
Expand financing mechanisms for energy efficiency projects	Create an internal revolving loan fund	Medium Term	<ul style="list-style-type: none"> • Public Agency • CDFIs and Private Lenders
Extend Existing Policies and Programs			
Implement new standards	Build support for energy use benchmarking and disclosure policies	Long Term	<ul style="list-style-type: none"> • Public Agency • Business Leaders/Associations • Building Owners • Contractors & Firms • Non-profit Organizations • Economic Development Organizations • State Legislature
Address Workforce Development Needs			
Improve knowledge and workforce skills in energy management	Facilitate training programs	Long Term	<ul style="list-style-type: none"> • Public Agency • WIB & Workforce Contractors • Contractors & Firms
	Develop energy boot camp for senior financial business leaders	Short Term	<ul style="list-style-type: none"> • Public Agency • Business Leaders/Associations • Building Owners • Contractors & Firms

Sample Detailed Projects

Primarily In-house: Create an Internal Revolving Loan Fund

Task	Timeframe	Implementing Parties	Resources/ Funding
Identify managing staff or partner	Short Term	<ul style="list-style-type: none"> In-house staff Partner Organization (if needed) 	Staff salary or partner contract
Conduct detailed demand analysis	Short Term, Medium Term	<ul style="list-style-type: none"> Staff Energy firms Business and Building Owners Non-profits/Organizations 	Outreach materials Potential contract for services
Raise capital	Medium Term	<ul style="list-style-type: none"> Government Banks Community Finance Institutions Foundations 	Grants, loans and other funding sources to establish the fund
Create financing policies	Medium Term	<ul style="list-style-type: none"> Staff/Organization Outside advisors 	Staff salary or partner contract
Market the program	Medium Term, On-going	<ul style="list-style-type: none"> Staff/Organization Energy firms Business and Building Owners Industry associations Utilities 	Web development and promotional materials
Distribute and manage funds	Long Term, On-going	<ul style="list-style-type: none"> Staff/Organization Fund recipients 	Staff salary or partner contract Management materials

Creating Partnerships: Host a Business Energy Challenge

Task	Timeframe	Implementing Parties	Resources/Funding
Identify partner organization and key staff	Short Term	<ul style="list-style-type: none"> • Agency • Partner Organization 	No funding if using in-house staff May require staff hire
Form energy challenge committee	Short Term	<ul style="list-style-type: none"> • Agency • Partner Organization • Business Leaders/Associations • Energy Firms 	No funding- existing staff and volunteers
Define design challenge components	Short Term	<ul style="list-style-type: none"> • Energy Challenge Committee 	No funding- existing staff and volunteers
Marketing	Medium Term, On-going	<ul style="list-style-type: none"> • Energy Challenge Committee • Agency • Partner Organizations 	Costs associated with web development, advertising, outreach
Launch event	Medium Term	<ul style="list-style-type: none"> • Committee • Staff • Participating Businesses • Community Leaders 	Event costs and promotion materials
Provide technical support to participants	Medium Term, On-going	<ul style="list-style-type: none"> • Agency • Partner Organization • Energy Firms 	May need to contract out these services
Culminating event	Long Term	<ul style="list-style-type: none"> • Committee • Staff • Participating Businesses • Community Leaders 	Event costs, awards, follow-up materials

Selected Tools and Resources

GEDI Industry Analysis Reports and Tools

Examples of survey instruments, focus group questions and an industry analysis workbook to track and organize information during the analysis phase are available on the [MIT GEDI Energy Efficiency Market Transformation website](http://web.mit.edu/colab/gedi/capacity-energy-efficiency-market-transformation-strategy.html).*

This site also includes four industry analysis and strategy reports prepared for Bellevue, Washington, Cambridge, Massachusetts, Las Vegas, Nevada and Passaic County, New Jersey.

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Resources to Learn More

Organizations

State and Local Energy Efficiency Action Network: www1.eere.energy.gov/seeaction

American Council for an Energy-Efficiency Economy (ACEEE): www.aceee.org

Institute for Market Transformation (IMT): www.imt.org

Alliance to Save Energy (ASE): www.ase.org

Rocky Mountain Institute: <http://www.rmi.org/RetroFit>

Publications

State and Local Energy Efficiency Action Network: Existing Commercial Building Working Group Publications

- Benchmarking and Disclosure: State and Local Policy Design Guide and Sample Policy Language: http://www1.eere.energy.gov/seeaction/pdfs/commercialbuildings_benchmarking_policy.pdf

* <http://web.mit.edu/colab/gedi/capacity-energy-efficiency-market-transformation-strategy.html>

- Energy Audits and Retro-Commissioning: State and Local Policy Design Guide and Sample Policy Language: http://www1.eere.energy.gov/seeaction/pdfs/commercialbuildings_audits_rcx_policy_guide.pdf
- Strategic Energy Management for State and Local Governments: http://www1.eere.energy.gov/seeaction/pdfs/commercialbuildings_factsheet_strategicenergymanagement_stateandlocal.pdf

US Department of Energy, Energy Efficiency and Renewable Energy: Commercial Buildings Resource Database

- Business Case for Energy Efficient Building Retrofit and Renovation: <https://buildingdata.energy.gov/cbrd/resource/917>
- A guide to Performance Contracting with ESCOs: http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20939.pdf
- Advanced Energy Retrofit Guide (AERG) for Office Buildings: <https://buildingdata.energy.gov/cbrd/resource/19>

National Action Plan on Energy Efficiency:

<http://www.epa.gov/cleanenergy/energy-programs/suca/resources.html>

Rocky Mountain Institute Tools and Guides for Property Owners on Deep Energy Retrofit:

http://www.rmi.org/retrofit_depot

Energy Efficiency Competition Guide:

www.energystar.gov/buildings/tools-and-resources/energy-efficiency-competition-guide

Energy Efficiency Services Sector: Workforce Education and Training Needs:

<http://eetd.lbl.gov/publications/energy-efficiency-services-sector-w-0>

Linking Energy Efficiency to Economic Productivity:

<http://aceee.org/research-report/e13f>

Local Governments' Role in Energy Project Financing, MIT GEDI and Institute for Market Transformation: [Link forthcoming]

Appendix A:

Energy Management Activities

Adopting an energy management plan / policy

These policies may provide authorization from senior management to engage in energy management; establish targets, actions and timelines; identify occupational responsibilities and team members to lead initiatives. Adopting such a high level commitment is a good early step in the energy management process.

Tracking Performance - Energy dashboards, reporting & benchmarking

Energy dashboards synthesize energy data from multiple sources (utility bill, equipment readings, etc.) and provide key information to the appropriate stakeholders involved in energy management (owners, managers, operators, etc.). While some firms develop dashboard systems independently, there are increasing number of software services that perform these functions as well.

Benchmarking

Benchmarking entails comparing a buildings' energy use with its historic use and the energy use of peer buildings. Benchmarking helps managers prioritize energy projects, and identify which buildings are performing poorly. The US EPA's Energy Star Portfolio Manager is the de facto national benchmarking platform, with 40% of commercial building space in the US tracked in this system. Other benchmarking systems also exist, drawing from their own comparison data sets and normalization criteria.

Operational improvements & commissioning

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.²⁸ 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.

Building commissioning or "tune-ups"

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 correcting any deficiencies. This service is typically provided by a 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.

Capital upgrades

In addition to operational improvements, many energy efficiency opportunities involve the "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.

Energy assessments to identify upgrade opportunities

In order to determine upgrade opportunities, building owners and/or managers typically have an “energy assessment” (or “energy audit”) performed on their property. The American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE) recognizes three categories of assessments:

1. A simple “walk-through”, to provide a high-level assessment of major opportunities.
2. A more detailed analysis, specifying different upgrade measures and estimates of their costs and financial implications.
3. A highly detailed assessment, reliant on computer building modeling with hourly simulations of building performance.

Remote Diagnostics

Computer applications are used to remotely identify and prioritize capital upgrade opportunities. These applications use simple information about building systems (entered by a facility manager, or obtained from public data sets) and utility metering data to construct models of buildings’ energy performance, and make educated guesses about upgrade opportunities. These applications can help energy service providers to more quickly and comprehensively assess buildings, and identify upgrade opportunities and/or operational improvements. Their market penetration remains limited at present, though it is growing rapidly.

Deep energy upgrades

“Deep energy upgrades” are defined as those that 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. 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.

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.

Green Leasing

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. Otherwise, buildings will face a “split-incentive” in energy use, whereby they are expected to invest in energy upgrades but tenants reap the financial benefits.
- 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.).

A number of organizations, such as the national Building Owners and Managers Association or the Natural Resources Defense Council, have developed green lease language.

Appendix B:

Barriers to Energy Efficiency

Imperfect Information and Capacity

Many property owners, managers and building operators lack information about energy efficiency technologies or upgrades. Staff may not be trained in current or necessary methods. Similarly, they have difficulty finding and vetting effective contractors for audits, upgrades, and installation.

Budgeting Challenges and “Hold Barriers”

Sometimes, there is a break-down in communication and financial planning between facilities management staff and ownership. Under their operating budget, facilities management staff may be able to undertake projects with a 1-2 years simple payback. Beyond this threshold, however, they need to coordinate with senior financial management in the building ownership group. These senior financial managers have limited time to focus on energy management, as it is often not considered their firms’ core business. Likewise, facilities management staff may lack the financial literacy to present a compelling case to senior management for upgrades.

Additionally, many building owners face “hold barriers” – they are hesitant to invest in longer payback efficiency measures when they may sell the building at a future time that is shorter than the expected payback period. Many properties are owned by real estate investment firms for which properties often turnover within four to 4-7 years. This limits the maximum financial payback period a building owner will consider for energy upgrade projects. Many MIT GEDI interviewees cited

this hold barrier as perhaps the greatest impediment to deep energy upgrade projects. Indeed, the Lawrence Berkeley National Lab’s survey of the ESCO industry found that the median simple payback period for ESCO projects in the private sector was 3.2 years in 2008, compared to 10.5 years in the public sector.²⁹ At such limited payback periods, much cost-effective efficiency is left “on the table”. Thus, mechanisms that allow financing repayments to be passed on to future owners are needed.

Split Incentives

Investments in energy efficiency in many buildings are stymied by split-incentives: Owners are expected to finance and make payments for energy services for the property, but tenants reap the benefits of lower utility bills.

The nature of the split-incentive problem varies with the different leases used in commercial real estate. While leases are structured in a variety of ways, three broad categories illustrate the issue:³⁰

1. **Gross leases** – Building owners pay utilities, property taxes, and other operating expenses, and charge tenants one base lump-sum rent. In this case, there is no split-incentive for financing owners’ projects, as building owners always have incentive to reduce buildings energy use and operating cost (though tenants will have no financial incentive to conserve energy and other utilities).
2. **Triple net leases** – All operating costs are passed through to tenants. In this

case owners have limited immediate financial incentive to reduce buildings energy use (though the building owner does have long-term incentive to improve the operating costs, allowing them to reduce tenants net costs, and charge higher rents). Building owners are frequently reluctant to finance upgrades, unless they can pass the costs of upgrades through to tenants.

3. **Modified gross leases** – Building owners pay a base percentage of operating costs, typically the operating costs of the first year a lease starts. Subsequently, a tenant pays for all escalations in operating costs. Again, under this scenario, the owner will have less incentive to engage in energy projects unless it can pass through financing repayments to tenants; otherwise, tenants will receive the benefits of lower operating costs and not owners.

In the cases of triple net leases and in modified gross leases, energy project financing can be more readily realized if the costs of projects can be passed through to tenants under existing lease terms. Alternately, efforts can be made to establish “green leases” with tenants and have tenants adopt (some of) the incremental costs of upgrades.

Utility and Regulator Buy-in

Utilities frequently play a central role in marketing and administering energy efficiency programs, and brokering projects to be financed. However, many states’ legislation and utility regulations do not reward utilities for facilitating the adoption of all available energy efficiency resources.³¹ Indeed, the utility industry has voiced concern that its business model is threatened by the growing adoption of efficiency and distributed generation, which reduce their revenue and limit opportunities for long-term expansion.³²

Perceived Need for Off-balance Sheet Financing

Many properties, particularly LLCs that own individual properties as investments, are highly leveraged, with little capacity to take on additional debt. Moreover, most mortgage covenants prohibit commercial building owners from assuming other debt, or liens on their property or equipment, without mortgage lenders permission. For these reasons, many commercial properties desire “off-balance” sheet financing, which does not appear on firms’ balance sheets as debt.

The types of financing mechanisms that can meet this off balance sheet criteria are in flux. Currently, the US Financial Accounting Standards Board (FASB) allows operating leases to be treated as off-balance sheet. However, FASB is harmonizing its standards with the International Accounting Standards Board. It is strongly anticipated that in 2016-2017, any lease will be considered on-balance sheet. However, the treatment of other financing mechanisms remains in doubt; property assessed repayments and service repayment may be able to be structured to remain off-balance sheet.

Contractors and ESCOs Market Gap

Contractors and ESCOs may not serve certain customer segments (small businesses, for example) if transaction costs are too high. Improving businesses’ knowledge of energy efficiency, providing financing mechanisms, etc. could reduce transaction costs and increase program uptake.

Lack of Project Financing

Due to the barriers noted above, financing markets for energy upgrades projects have been slow to materialize.

Appendix C: Summary of Energy Challenge Programs

Energy Challenge Programs recruit owners and operators into reducing energy consumption and developing more sustainable practices in their buildings. They motivate building owners through brand enhancement and competition. Energy challenge programs also reduce information barriers to energy efficiency by educating building owners and managers about opportunities to make buildings and operations more sustainable and profitable. The programs often reflect the needs of different building types and stakeholders. Energy challenges further motivate owners and managers by providing rewards to effective action. A survey of 33 programs nationwide found that most programs operate on annual budgets of less than \$100,000, are free to participate in, and have some kind of utility partnership.

Key Considerations for Success

Energy challenge programs require financial and institutional stability for at least two years to have real sustained impact and to move towards financial sustainability. This time frame is based upon a number of case studies done of energy challenge programs in Marshfield, Massachusetts, Bellingham, Washington, and Denver, Colorado. Many successful programs have operational partnerships with existing real estate networks and integrate these networks into the structure of the program. Additionally, it is important to have segmented strategies for different building types and to keep participants engaged. Programs should supply high impact “to-dos” as part of the challenge that should sequentially lead organizations to making long-term energy efficiency investments. Organizations implementing energy challenge programs should also

consider having ongoing registration so that once buildings sign up for the first year they are automatically signed up for all subsequent years unless they request to be unregistered.

Steps to Establishing Programs

Define target markets - The first step to establishing an energy challenge program is to segment the market and identify different building types and stakeholders.

Identify services for the market - Identify key programs, services, and financing strategies applicable to targeted building types. Key organizations that can assist with disseminating marketing for the energy challenge program should also be identified.

Set goals – Develop clear goals that will facilitate choosing a metric with which to compare participants and help to explain what the energy challenge program hopes to achieve. For example, the goal of the program could be to reduce energy use per square foot by a specific percentage, or simply to demonstrate environmental stewardship by promoting energy efficiency.

Define the scope of the program – Decide which types of buildings to include and how large of a region will be covered by the program (e.g. region-wide, city-wide, within a certain district or zip code, etc.).

Define the period - Determine the length of the challenge and how many benchmarks or check-ins will occur. Energy challenges are

typically between one and twelve months.

Establish funding sources and management structure – Once the initial steps have been completed, develop the challenge by identifying potential funding sources and a program manager. The program manager should have sufficient expertise with energy efficiency and should be a staff member of the hosting organization. During the development of the program it is important to identify and integrate existing local energy challenge programs. For example, in a locale that already has a green building award program, a new program could be developed that offers more comprehensive guidance and specific challenges but that integrates its award ceremony with the existing program.

Develop participant “flow” through components of program -

- Registration – Allow at least a 4-week registration period so that participants can discuss the program with their peers and encourage others to participate.
- Competition kick-off – Conduct a meeting with participants to make them aware of the competition requirements and resources available. Be sure to provide technical support in the form of training sessions to help participants with benchmarking and utilizing the resources offered during the challenge.
- Benchmarking – Encourage participants to adopt benchmarking as a best practice if there are not existing, mandatory disclosure policies in place.
- Auditing Energy Use - A successful energy challenge program will provide participants with third party help with audits or help with locating funding for audits.
- Completion categories and criteria- Create different tiers of participation, for example three tiers for small,

medium, and large buildings.

- Keep score - The metrics used to measure buildings should reflect the goals of the competition. Some examples include change in energy use intensity, change in greenhouse gas emissions, or change in utility costs. Use a baseline measurement to compare each participant’s past energy usage. Participants can use tools such as the EPA Energy Star’s Portfolio Manager to track and submit their energy use data. Participants can also be required to develop a list of suggested improvements to reduce their energy use or provided with online scorecards to assist with benchmarking. Organizers should also make an effort to verify the data, or at least verify the winner’s data.

Ongoing outreach and engagement – When developing the program, targeted outreach should begin 8 to 10 weeks before the start of the competition. Tailor outreach to the interests of potential participants and benefits of joining the challenge. Engage participants with newsletter articles and email reminders as well as progress updates. Organizers can also host meetings or put together forums to help participants network and share best practices.

Recognition - Provide prizes and recognition in each category. Determine additional awards, such as a Most Valuable Tenant prize. Consider participation-based recognition in which all competitors receive a certificate for participating in the program. The prizes themselves should be tangible: a printed certificate or tickets to an event (either purchased or donated). The awards ceremony should be a large, well-publicized event with city leaders involved.

Following-up on the program – The last step of developing and implementing a successful energy challenge program is to cycle into future iterations of the program. As soon as the competition ends follow-up with participants to answer any remaining questions

and provide information about the future of the program. Automatic re-enrollment, as discussed earlier, is a good way to encourage the future success of the program.

Potential Partner Organizations Profiles

Those looking to establish an energy challenge program should look for organizations that may be able to provide funding, assistance, or even form a partnership in developing the program. The following organizations assist with program design and/or program management. They may offer replicable models.

Better Buildings Challenge

The Better Buildings Challenge is a part of the U.S. Department of Energy's Better Buildings Initiative. Its goal is to make municipal, commercial, and industrial buildings 20% more efficient by 2020, to save over \$40 billion each year for organizations in the U.S., and to stimulate job creation. The Better Buildings Challenge currently has 40 local government partners across the United States. In Atlanta, the program has engaged 70 buildings and the city created a public-private partnership to provide access to project financing, free assessments, training, and public recognition. Los Angeles is working on a program to cover 30 million square feet and is building a network of partners who will provide free resources for the challenge's participants.

BOMA Kilowatt Crackdown

In 2009, BOMA Seattle-King County, in association with the Northwest Energy Efficiency Alliance, kicked off the first Kilowatt Crackdown. The goal of the program was to raise awareness of energy efficiency and educate BOMA members on the resources available to implement energy efficiency upgrades. BOMA Kilowatt Crackdowns have now been implemented in multiple cities and encourage the adoption of energy efficiency improvements through the help of local energy service companies, local port authorities, and city incentives.

ICLEI/Office Depot Green Business Challenge

The ICLEI/Office Depot Green Business Challenge was co-developed with the City of Chicago as a part of its Green Office Challenge. The Challenge is collaboration between the City of Chicago and ICLEI (Local Governments for Sustainability) with core funding from the Office Depot. The Challenge provides a web tool that assists buildings in reducing waste and reducing their use of energy and water. The competition is open to small businesses and large, Fortune 500 companies, so long as the company can form a team within their company to complete the required challenges. Teams earn points for completing different activities, many of which have been re-designed for 2013. Through the Challenge, participants have saved over \$17.5 million in energy costs.

Bay Area Green Business Program

The Bay Area Green Business Program was developed to distinguish small businesses that protect, preserve, and sustain the environment. The program is run by a partnership of local utilities and environmental agencies that officially recognize buildings that meet the Green Business Program's standards. There are local chapters of the program in nine counties. The program has the capacity to certify most small to medium-sized businesses and non-profits.

Seattle 2030

Seattle 2030 is a high-performance building district in Downtown Seattle. The district's goal is to reduce the environmental impact of constructing and operating buildings and to educate and encourage collaboration between building owners and managers. The district is a public-private collaborative that uses the goals of the Architecture 2030 Challenge for Planning as guidelines. Seattle 2030 looks to achieve these goals at a district scale and encourages buildings in the district to register and participate in the EPA Energy Star's Battle of the Buildings.

EPA Energy Star's Battle of the Buildings

The EPA Energy Star's Battle of the Buildings is a self-described "Biggest-Loser" style competition. The program awards the biggest energy loser, or the building or space that achieves the biggest reduction in energy use during the competition. The program also includes a Most Valuable Participant award for the participant that best communicates the importance of saving energy to stakeholders. In 2012, competitors in the Battle of the Buildings saved an average of \$25,000 and reduced their energy use by 8%.

EDF Climate Corps

Climate Corps fellows are graduate students trained in energy efficiency and energy management. They are placed within companies to work on a variety of energy related projects. Each year there is a new class of fellows that work to promote smart energy management practices in the host organizations. EDF Climate Corps fellows work on energy management strategies, information systems, financing mechanisms, and employee engagement campaigns.

Project Database Design and Management and IT Platforms

Local government can facilitate energy efficiency projects via a database or energy challenge website. Highlight green businesses and list energy efficiency tools and resources for easy access. Energy challenge websites can also have news feeds updated with the progress of the challenge. The following organizations can assist with program database design and/or management and in some cases can supply IT platforms.

GreenPoint

GreenPoint is an information services company. Their mission is to promote the adoption of energy efficiency measures in existing buildings. GreenPoint provides a Green Per Square Foot platform that can help building owners and managers find energy and money-saving opportunities and connect

users with energy retrofit service providers. The platform delivers comprehensive and timely information about sustainability products, services, and incentives. It includes an e-procurement system that matches customers with services and emphasizes cost savings and transparency.

BetterBricks

BetterBricks is the commercial building initiative of the Northwest Energy Efficiency Alliance. The program offers education and training workshops and seminars to participants and provides practical information and strategies on how to reduce energy use. BetterBricks has developed its own award system that recognizes commercial building professionals who have promoted solutions resulting in significant energy savings. BetterBricks is also a source for articles, research, tools, and case studies that supply information on various energy efficiency topics.

Better Buildings Alliance

The Better Buildings Alliance allows local governments to work directly with the U.S. DOE to further clean energy goals and access technical assistance. The program helps sustain the success of American Recovery and Reinvestment Act (ARRA) funded work, makes use of the DOE's expertise, and puts local governments in contact with one another to facilitate the sharing of ideas and solutions. The Better Buildings Alliance focuses on strategic target areas and members must commit to certain energy-saving benchmarks.

Toolkit for Sustainable Business

The Toolkit for Sustainable Business was developed for A Better City's Challenge for Sustainability. The toolkit is composed of information and guidance for cleaning and toxics, energy efficiency, people and culture, purchasing, renewable energy, transportation, waste reduction, and water efficiency. The toolkit also provides examples of implementation of suggested procedures and links to media references.

Outreach and Dissemination Partners

When establishing an energy challenge program, approach a number of organizations for help with outreach and dissemination. BOMA is a good place to start as BOMA has a history of endorsing energy challenge programs. Reach out to real estate organizations such as local chapters of the National Real Estate Investors Association or Local Real Estate Investment Clubs. Business Improvement Districts can be potential partners, for example the Seattle 2030 District. Other business organizations to consider include local corporations and local business associations. Outside of the real estate and business industries, potential partner organizations can include NGOs, specifically environmental or business-friendly NGOs.

Utilities can be extremely valuable partners and provide a variety of resources. Utilities can provide the data necessary for automatic benchmarking, can assist with data downloading, and can connect programs with free audit opportunities. Utilities are also an important source of funding, provide rebates, and can even help with program development. In San Francisco, PG&E provides the local energy challenge program with energy audits and connections to interns. Remember to make use of social media. Facebook and Twitter can be valuable resources, and energy challenge programs should all have publicly accessible, user-friendly websites.

Program Funding and Financing Partners

A variety of opportunities exist for funding energy challenge programs. A survey of 33 existing energy challenge programs found that utilities are the single largest source of funding, providing support to over 41% of the programs. Only 14% of the programs surveyed receive state or federal funding. A few use membership fees to raise funds, but the majority of the programs (80%) are free for participants. Other potential sources of funding include trade allies, such as Office Depot for the Green Business Challenge, or local companies that are interested in energy

efficiency. Energy service contractors can also help out by providing free or low-cost audits.

Required Resources

A survey of 33 existing energy challenge programs found that most programs require a staff of two or more full time equivalent employees. Staff members spend the most time on programming and events, community engagement, research, marketing, and developing technical knowledge. As mentioned before, 80% of these programs are free for participants and the program budgets range from less than \$100,000 to greater than \$400,000. Two-fifths of the programs operate on yearly budgets that are less than \$100,000.

Endnotes

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