Sub-task 6.6
Primary Market Research Report

A report on the major findings of the costs, benefits and barriers of commercial energy efficiency retrofits from 26 in-depth one on one interviews with commercial building owners, service providers, public funding managers and private investors.

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and
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BACKGROUND

In GPIC's first year, sub-task 6.6, led by Penn State University's Smeal College of Business and represented by Clean Markets, was charged with creating a quantitative baseline model of the existing energy efficiency industry. The specific deliverables for this task are shown below.

6.6.1 Gathering baseline information from other Tasks and through secondary and primary market research, create the baseline industry model on the existing costs and value within the current building industry energy efficiency retrofit delivery system.

6.6.3: Create business model outlines and value statements to facilitate the future marketing of retrofit systems, software, policies and behaviors.

The challenge posed to the team was to determine:

- Who are the major participants in the commercial retrofit delivery process?
- What value is each participant providing today?
- What are the costs of the current system?
- What value are participants deriving from the system today?
- How can the market transform to provide greater value to end-users and to realize greater savings?

The team's approach was to create a bottoms-up model, collecting as many data input points as possible. The sources used for the model inputs were as follows:

- A literature review of over 30 sources, which was documented in the "*Secondary Research Review: Commercial Energy Efficiency Retrofit Value Delivery System Analysis", a Mid Year Findings report of sub-task 6.6*
- A profit pool analysis of the profitability of existing types of service providers within the commercial energy efficiency retrofit market today
- Actual pre and post building retrofit data from commercial and institutional buildings submitted by Penn State University and Liberty Property Trust
- Primary market research conducted with twenty-six building owners, retrofit service providers, public financing program managers and private investors.

This study will focus on the results and conclusions drawn from the twenty-six primary market research interviews. The actual Cost/Benefit model and the Mid-Year Findings report were submitted to GPIC in separate reports.

APPROACH

In the 3rd and 4th quarters of 2011 the Smeal College team, led by Clean Markets, conducted 26 in-depth one on one interviews distributed among the market participants shown in Table 1 below.

Table 1. Distribution of Interviews Per Sector

Sector	Number of Interviews
Commercial building owners and facilities managers	5
Engineers	5
Architects	6
Construction Management	4
Supplier/Manufacturer	1
Energy Service Company	1
Public Financing Program Managers	2
Private Energy Efficiency Investors	2
TOTAL	26

The purpose of the research was to identify the costs/benefits associated with commercial energy efficiency retrofits from the perspective of the various entities involved in the financing, purchasing, and delivery of these retrofits. The costs of retrofits were derived from actual energy retrofit project data, as well as responses from interview participants. The benefits of the retrofit process, being more subjective, were derived primarily from this market research study with retrofit participants.

Interviewees were selected from a pre-qualified list of 60 individuals that had either been involved in retrofits in the region, or who had publicly expressed an interest in energy efficiency retrofits. The research was designed to gain an understanding of:

- The drivers of commercial energy efficiency retrofit projects
- Perceptions of the benefits in participating in a commercial retrofit project
- Perceived barriers in initiating and completing commercial building energy retrofits.
- Recommendations to improve the energy retrofit industry/process

The Interview Guide for all sectors was approved through the Penn State IRB process and can be found in Appendix A. All of the interview questions followed a similar pattern, with the exact phrasing and focus differing for each type of participant. There were also 2 types of guides for each sector interviewed- the first

for those who had conducted commercial retrofits and the second for those who were familiar with the retrofit process but had not actually been involved in the process at the time of the interview. The majority of respondents had participated in an actual retrofit.

EXECUTIVE SUMMARY

Although the value chain that participates in commercial energy efficiency retrofits is extensive, building owners and investors drive the demand side of the market. These are the sectors that are making choices to invest in energy efficiency retrofits versus their opportunity costs of investing in other areas. Service providers, on the other hand, are critically important in introducing new business models to respond to the needs of the demand-side of the market.

This study found that the key drivers for energy efficiency retrofits varied by market sector, but the primary drivers for building owners were: to achieve a return on investment; to enhance their company's image and to provide value to tenants, thereby increasing the net occupancy of their buildings. For investors, the goals are to minimize investment risk, to improve their company's image or, for public investors, to foster community and economic development. For service providers, the biggest drivers are enhancing their companies' reputations and differentiating themselves from their competition.

One of the most interesting trends found in commercial retrofit business models is a step away from the ESCO model, where an ESCO will look for projects that are "low hanging fruit", such as lighting, then guarantee the energy savings and retain those savings as payment for their services. Commercial building owners and owners of large institutional campuses, such as hospitals and universities, would prefer to keep all or part of the savings themselves. New business models are emerging where energy efficiency is treated as a "service" rather than a liability on a building owners' balance sheet. In the "energy efficiency as a service" model, risk is shared among the financer, the building owner and the project developer.

In the case of many large commercial property owners, such as Real Estate Investment Trusts (REITs), they will generally self-finance retrofits even if their tenants pay the utility bills. The benefit of investing in retrofits is that lower energy bills attract tenants, and the "Net Occupancy" of their buildings will improve. If they have a knowledgeable facilities' team, they will be inclined to manage the retrofit process themselves rather than go through an ESCO. However, there still remain significant obstacles and barriers for the building owners and facilities' managers who manage their own retrofits.

All sectors identified the following major barriers to implementing integrated commercial energy retrofits: the decision process for property owners is complex; access to capital for small and mid-sized buildings is limited; it is time-consuming and expensive to acquire building baseline performance data; energy and financial projection models are too complex; property owners have trouble finding consultants they can trust to lead them through the process; there is often a lead time for high performance energy equipment; building owners are distracted by day to day business management and can't dedicate staff time to implement a retrofit project; most building owners do not pay the building's utility bills; property

owners do not want to take a risk with unproven technologies; and property owners' payback expectations are too short to allow for deeper retrofits.

In addition to the major barriers listed, investors cited the following as barriers to increasing retrofit investments: property owners do not want to negatively impact their balance sheets with debt; each building is unique and there is not one size fits all financing model; there is a weak pipeline of investment grade projects; in a larger fund, no one knows how to spread the risk between government and commercial projects; actual savings are often less than predicted. The only additional barriers identified by service providers that were not mentioned by other participants were that energy prices are artificially low and major retrofits will disrupt customer operations.

It is interesting to note the disconnect that exists between building owners and service providers' perceptions and those of investors about the role that "access to capital" is playing as a barrier. Small to medium sized building owners and service providers see a lack of access to capital as a major barrier, while investors see a weak pipeline of investment grade projects as a major issue.

Several opportunities for improvement were identified that have implications for GPIC:

- Predictive energy saving and financial models and lifecycle analysis tools need to be made more accessible, more accurate and more user-friendly
- Property owners need a well documented retrofit decision model
- New lease models are needed to overcome the split incentive issue
- Technology improvements are needed in a few critical areas that are identified throughout the "Key Findings" section
- Off-balance sheet methods of financing need to be more widely disseminated
- Investors need to support integrated service providers
- Training programs are needed for all service providers in the value chain.
- A centralized database with technical and financial retrofit benefits profiled would help service providers to convince owners to conduct retrofits
- Integrated design tools are needs to adequately provide retrofit guidance to all contractors throughout the value chain

Other opportunities for improvement were identified in the "Key Findings" sections for each market sector. The sector that seemed to have the most concern with the market changes that GPIC might bring about was Service Providers. Their key implications for GPIC are listed on page 21, which clearly show a concern for how the industry might transform. Concerns cited include lower profit margins as retrofits become more commonplace, and a desire for GPIC to recognize experienced contractors that are achieving results. In contrast, building owners and investors, the drivers of the market, appear to welcome changes that might increase retrofit opportunities.

KEY FINDINGS

The following key findings from this study are separated by the representative sectors interviewed: Building Owners and Managers, Investors and Service Providers. The costs and benefits of the current retrofit delivery system are accrued differently for each sector, as well as for the sub-sets within those sectors.

The demand side of the market, represented by the Building Owners and Managers and Investors, are the critical sectors that will drive the market for energy efficiency retrofits moving forward. They are the sectors taking the most risk by investing in energy efficiency retrofits, and meeting their needs will ultimately create a sustainable industry. The Service Providers, although critical market participants, must create business models responsive to the needs of the demand side, or they will not keep pace with market shifts and eventual transformation.

BUILDING OWNERS

Building owners and their representative Facilities Managers are the ultimate "Purchasers" of energy efficiency retrofits. The needs of this group are most important and must be carefully considered in any efforts to transform the buildings industry. The decision to invest in an energy retrofit depends upon several factors for building owners, including who is paying the utility bills.

It is very apparent that different types of building owners have different investment criteria. Institutional Owners indicated that they would accept a ten-year payback on their EER investment while Investors/Landlords said that they require a maximum payback of 1-2 years. Commercial businesses that own and occupy their facilities indicated that they require a 3-4 year payback. This implies that different segments of Purchasers market may require different retrofit solutions.

Owners of larger portfolios of buildings, such as Real Estate Investment Trusts, are perhaps the most sophisticated consumers of efficiency retrofits. One company said that achieving a portfolio of high -performance buildings is a corporate strategic initiative. They are not only retrofitting their buildings for energy efficiency, but they also must drive that performance initiative throughout the entire organization, to get everyone is on board and cooperating.

Barriers

The following barriers were reported by building owners to implementing energy retrofits in commercial properties:

- **Decision process:** The initial barrier for many buildings owners is to know where to start in conducting a building energy efficiency retrofit. Even larger property owners are not sure of the steps to take.

As one property owner expressed:

> *You're an owner of a lot of real estate and you're not sure how to make the buildings more efficient. Each building is unique, and you have to evaluate them one by one. A toolkit is completely missing out there. I don't know if we've done it the best way. That is just the way we did it.*

- **Access to capital**: Small -to medium- sized building owners see access to and competition for capital as a major barrier to increasing energy efficiency retrofits in commercial buildings. For some, this means difficulty in accessing financially attractive external financing. For others, this means difficulty in meeting internal return on investment criteria that is defined by their firm. And for still others, it means difficulty in making a compelling business case in order to get key decision makers to invest significant capital in a facilities related cost reduction project (as opposed to investing in the core business).
- **Access to building performance data**: Contributing to the difficulty in making the business case for energy retrofits, many buildings lack the metering necessary to provide a clear understanding of building performance and of relative opportunity for energy savings. Even without doing a retrofit, one building owner achieved savings as a result of their building automation system. The company saved 7.5% in energy in the first year by recognizing that buildings were running at full consumption over the weekend, and then ratcheting the systems back on non-work days.
- **Equipment delays**: Even if the decision is more immediate, like replacing a failed HVAC system with a high -energy performance system, there is a lead-time for Energy Star units. You may not be able to get one to satisfy the immediate need of the building.

> *"If you have a failed HVAC system, you can't wait 2-3 weeks for an Energy Star replacement. Equipment manufacturers need to get on board too."*

- **Time to implement**: Building owners also note that energy efficiency retrofit projects require a great deal of staff time to implement. Further, they note that solutions are not easily transferable from one building to another due to the uniqueness of each building and to the wide variability in energy costs and building construction norms across the United States.
- **Split incentives**: For building owners who do not occupy their buildings, split incentives with tenants, who typically pay the utility bills, presents an additional barrier. If a retrofit were implemented, tenants would reap the direct financial benefit from the energy savings.

Opportunities for Improvement:

The following opportunities for improvement to implementing commercial energy efficiency retrofits were reported by building owners:

- **Predictive and M&V models**: Building owners believe that the process of conducting energy efficiency retrofits could be improved through the development of efficient and effective tools to evaluate retrofits, such as sub-metering, life cycle costing models, real estate portfolio level models, and building performance models.
- **Decision process**: Many suggested that having a well -documented retrofit process to follow would be most helpful.

- **Model leases**: Building owners who do not occupy their buildings also see a need for a new lease structure model that would help them to overcome the split incentive issue. Especially for owners who do not occupy their buildings, lease timing and structuring is an important consideration when considering EER investments. This implies that some type of lease portfolio analysis could be used to identify the optimal timing for a landlord to implement an energy efficiency retrofit. Some owners who do not occupy their buildings are using their ability to pass operating expenses onto their tenants as a means to finance low-cost energy efficiency improvements. One company saw that providing lower energy bills to tenants increased the net occupancy of their buildings relative to their competitors. This implies that there may be an opportunity to use this methodology to finance some portion of an energy efficiency retrofit.
- **Better information on resale value**: There is significant disagreement among building owners as to whether the market will pay more for a more efficient building. This implies that there is a lack of clear, consistent information relative to the market value of a buildings level of energy efficiency and the related certifications (e.g., LEED, Energy Star).
- **Technology improvements**: Some Purchasers believe that technology improvements in a few specific areas would have a huge impact on their ability to improve the energy performance of their buildings. The most commonly cited need was for non-proprietary control systems for lighting, HVAC, etc. In addition, it was noted that there is no method (short of completely rebuilding the walls) to significantly improve the thermal insulation performance of the exterior walls of masonry buildings without changing the exterior appearance or creating condensation issues. Given the large number of buildings in the GPIC footprint and in the United States that would directly benefit from innovations in these two areas, it may make sense for GPIC to include these areas in its technology innovation efforts.

INVESTORS

This study interviewed both private investors, who manage energy efficiency funds on behalf of a private company or companies, and public investors, who manage funds for a public good with taxpayers' dollars. The goals of private funds for energy efficiency investments tended to be to minimize investment risk. They are looking for an appropriate risk allocation and return, sharing risk among property owners, project developers and the investor. One firm shared that a 15% return is generally sought for efficiency investments. Larger private funds may decide to enter this space because it fits the company's sustainability strategy, but each deal has to make financial sense in order to be executed.

The goals of public investors, on the other hand, may focus more on societal benefits, such as community and economic development. While these other benefits are in the forefront, there is still a strong need for these projects to demonstrate financial benefits. When structuring investment deals, public investors also seek to minimize risk for complex projects such as gut rehabs by requiring a higher debt coverage ratio from the property. In other words, the income coming into the property over the course of the loan has to exceed the loan payments going out.

Although each of the four funds interviewed had a slightly different perspective, the criteria used to evaluate a good commercial energy efficiency investment were very similar. All of the funds that participated in this study evaluated commercial efficiency investments with the following criteria: performance of the technology; credit-worthiness of the building; operational profile of the building; potential energy savings from the project; utility rates over time and strength and reputation of the developer and project team.

The biggest difference between public and private investors is how they see their role in the energy efficiency market. Although both realize that they are catalysts for the market, creating showcase projects, public investors see their role as transitional. Public dollars are often first deployed as grants, then subsidized financing, and then a transition to the private investment market.

Barriers

When asked about the current barriers to commercial energy efficiency investment, responses varied slightly, but the following barriers were cited:

- **Daunting decision process for owners**: Finding trustworthy sources of information to take property owners through the retrofit process, such as: designing and modeling the project; choosing equipment; applying for funds; verifying the savings, etc. Often investors become the "Owners' Representative" on the project, holding their hands through the process, which can take a lot of investor's time.

> *"I've been discouraged about how little conversation there is about energy when designing a rehab. There are few architects that tell their clients that have three choices in heating and cooling a building: good, better and best, along with lifecycle costs to operate. More likely they will pat you and say, don't worry, it will be built to code."*

- **Impact on owners' balance sheets:** Financial Accounting Standards Board (FASB) regulations will require efficiency financing to be treated as a liability on their balance sheets, disrupting the traditional ESCO investment model, and giving way to a new model of "energy efficiency as a service".
- **Each project is unique:** There is not a one size fits all solution for commercial building retrofit financing. Each building is unique, so investment terms have to be structured individually.
- **Deal flow for investors:** Although many property owners cite lack of capital as a barrier for them, investors cite a weak pipeline of investment projects as a barrier for investors. There may be projects seeking capital that are not investment worthy, such as a building owner with short-term plans for ownership.

> *"Investors do not just go out and hang up a shingle and have prospects banging down their doors. They have to go out and actively market for projects."*

- **Risk Allocation:** Government projects have a lower risk profile than for commercial buildings, but the energy savings might be the same. Because investors seek to minimize risk, they tend to gravitate to retrofits for government buildings. No one knows how to spread the risk in larger funds between government and commercial building projects.
- **Lease structure:** The issue of split incentives, where the tenants pay the utility bills, can be a barrier for a building owner.
- **Unrealistic investment expectations:** Often property owners are seeking 3-5 year paybacks, off-balance sheet financing and few restrictions on equipment. For deeper retrofits, most investors stated that terms needed to be over 10 years.
- **Deep retrofits take time.** Building owners are distracted by the day to day operations and marketing of their businesses. They will put off an energy efficiency investment because it takes too much of their time to figure out and manage.
- **Technology risk:** Owners would like to have high performance buildings but they do not want to take risks with unproven new technologies.
- **Models are complex.** The federal government requires modeling data for property owners to receive energy efficiency tax credits. Simpler models would make it easier for property owners to participate.
- **Realization of savings:** Actual savings can be much less than projected due to contractor performance or occupant behavior. This adds an extra burden of measurement and verification for the investor to make sure that savings are realized.

- **Equipment shortages:** Often an owner may want to put in Energy Star equipment, but it may be backordered and they can't wait for the equipment to be put in and still meet their schedule.

Opportunities for Improvement

Investors interviewed saw the following opportunities to improve the current commercial retrofit process:

Off-Balance Sheet Financing: All investors felt that keeping the cost of energy retrofits off of owners' balance sheets is a critical opportunity. New business models are emerging, based upon the Transcend Equity model, where energy efficiency is treated as a "service" rather than a liability on a building owners' balance sheet, or as a way to disguise equipment sales for manufacturers. In the "energy efficiency as a service" model, risk is shared among the financer, the building owner and the project developer.

> *You need a contractual structure that works for both sides. Finance is about the distribution and sharing of risk- this is not a policy problem.*

Risk Allocation: The investors interviewed seemed to agree that ESCO models are not the most advantageous for property owners. One investor shared that government buildings only use ESCOs because federal enabling legislation for government retrofits requires government agencies to conduct retrofits without capital. It forces government agencies to use an ESCO model. Although ESCOs do take on risk, the risk is generally small because ESCOs are doing projects that are "low hanging fruit", with marginal benefit for the owner. In the Transcend model, the developer is paid over 10 years and Transcend holds most of the risk for that time.

Access to Capital: One of the reasons given for the perceived lack of capital is that the largest manufacturers of energy efficiency equipment also have ESCO divisions that specify their own equipment for retrofits. Very little capital is going to independent service providers who provide integrated solutions and who will specify the best available technology for a retrofit project. Investors need to view integrated service providers as those achieving the highest long-term savings and those who are minimizing project risk. If investors start to invest in that space, then more service providers will provide integrated solutions.

Training: Training of contractors is another important improvement in retrofit

> *"There are so many people that touch a building and every one of them has the ability to veto or sabotage the energy savings. It can be as simple as the contractor putting up the drywall who leaves lots of air gaps or the electrician that cuts through the insulation to run a wire and doesn't reseal things. Everyone in the delivery chain needs training*."

delivery. Training was also recommended for energy auditors regarding available financing, and getting auditors involved in the financing process.

Other recommendations from investors included streamlining repayment mechanisms, and making the ability to rent efficiency much like paying a monthly like a cell phone.

SERVICE PROVIDERS

Seventeen Service Providers were interviewed, which were heavily represented by architectural and engineering firms with the following concentrations: six architects, five engineers, four construction managers, one supplier and one energy service company (ESCO). Of the engineers interviewed, three represented engineering/auditor firms and two represented architectural and engineering firms. The interviewees were pre-selected, based upon their prior experience with participating in building energy retrofits.

The questions for this group were similar to those of building owners and investors, where the research team was seeking to understand:

- The drivers for these firms in pursuing energy efficiency retrofit projects
- How they perceive the benefit to owners and operators of commercial buildings that are undertaking a retrofit project
- Perceived barriers for building owners in completing commercial building energy efficiency retrofits
- Recommendations to improve the energy retrofit industry/process

The majority of the service providers interviewed, especially architects and engineers, work at firms that are first movers in the energy efficiency/sustainability arena. Because this market is relatively new, one of the biggest benefits the firms experience from conducting energy retrofits is enhancing their company's reputation. With a first mover philosophy, the firms want to differentiate themselves as thought leaders in the energy retrofit arena and they are taking steps to build a portfolio of successful projects.

Along with the benefit of improving company reputation, most interviewees stated they see their enhanced reputation as a foundation for repeat business and overall company growth. Responders indicated that their firms are currently willing to take lower profit margins now to get more work, improve their status in the energy retrofit market, and then hope to increase profit margins once they are established. It is worthy to note that some are experiencing lower profit margins on current projects partially due to the poor economy. Profit margins for service providers ranged from 5% to over 20%, with most responders indicating that current profit margins fall within the 5-10% range.

The service providers benefit their owners and operators of commercial buildings in several ways. They provide a degree of education to the building owners and operators to help them understand the value proposition of energy efficiency

retrofits. The architect and engineering firms coordinate the engineering and construction phases of the project in order to ensure that the energy efficiency retrofits provide the comfort, lighting, control and energy savings they were designed to deliver.

According to those interviewed, benefits provided to building owners by the service providers are 1) reduced utility/operations costs, 2) holistic look at opportunities to reduce energy consumption, 3) create a positive tenant impact and 4) utility rate reduction strategies are recommended by auditors and energy consultants. However, as with various answers, benefits are tied to what the client wants, needs, and is willing to pay for in regard to a retrofit. Many building owners will do retrofits in piecemeal because they do not have, or are not willing to spend, the capital for an integrated retrofit in one project.

Costs

Service provider interviewees were asked about the costs involved with conducting energy efficiency retrofits. The answers were somewhat dependent on whether the perspective was from the engineer or the architect. Some architects subcontract large portions of the work to mechanical and electrical engineers. This is thought of as an expense, although it is typically passed through to the client with markup. The auditing and energy consultant firms have morphed their service offerings over time to reflect more than just energy and utility rate evaluations, to also addressing retrofit opportunities to reduce overall energy use. Costs to enter that level of service included training (LEED AP, Energy Star, etc.), time (working with client, contractors, and other service providers), and to some extent equipment (infrared, blower door, and other energy efficiency detection equipment).

The one ESCO interviewed indicated that customer acquisition costs were very high for ESCOs. A $6 Million sale of electricity may only take two weeks, while a $6 Million ESCO contract could take two years to close. As a result, there is a perception that the profit margins for ESCOs are a lot higher than for other industry service providers. But the ESCO that participated in this study felt that ESCO profit margins were only in the range of 5-10%, as identified by other service providers.

Barriers

Interviewees' perceptions of retrofit barriers closely match those described by building owners and investors in previous sections, with a few additions. Architects and Engineers expressed the barriers to implementing energy efficiency retrofits in order of declining frequency as follows:

- **Capital Availability and Budget Constraints**: Customers are completing one project at a time, or do not have the funds to take a holistic approach. Responders expressed that building owners and operators experience limited availability or access to capital for construction and renovation, especially in the building size that GPIC is targeting. One ESCO said that the ESCO community ignores buildings in the 20,000 to 100,000 square foot size range, because the payback isn't going to be there.

- **Trust in Outcomes:** This is a combination of owner and operator uncertainty as to whether the energy efficiency retrofit will deliver on claims, will come in on or under budget, and will be able to be controlled/managed by their facilities staff.
- **Short–time horizons and ROI expectations**: Owner or operator's ability or willingness to extend beyond a 1 to 2, or 3 to 5 year time horizon for payback. It was expressed that most owner/operators tend to want a 1-3 year payback period, limiting the technologies and the size of projects service providers can complete. Often simple paybacks versus a full lifecycle cost analysis were utilized in developing expectations of returns and do not represent the full value of a retrofit.
- **Access to building performance data**: Establishing a baseline or model output for a building is difficult without auditing and monitoring, which is an expensive and time-consuming step. Architects and engineers are finding access to preliminary building data difficult to obtain, and an "expensive" proposition for an owner or operator. Moreover, if initial profiles are sketchy, it impacts decisions such as identifying the best approaches to retrofit buildings, as well as being able to quantify the overall value of an upgrade to the building owner.
- **Short term owners/renters**: Facility owners or operators not slated to remain in the facility for extended periods of time may not experience the full benefits of an energy retrofit and are therefore reluctant to invest. Those with very short time horizons will not take on long-term projects whose paybacks extend beyond their ownership/occupancy.
- **Availability of well-trained advisors**: As this industry is still relatively new, there is insufficient experience across the engineering, contracting, and servicing industry. Architect and engineering firms are challenged to find competent partners who are able to deliver on the full benefits of an energy efficiency retrofit. The architect and engineering firms often find that inexperienced providers revert back to the technologies and solutions they are most familiar with, jeopardizing the goals of the project.
- **Artificially low energy prices**: As US energy prices are depressed relative to the rest of the world, there are insufficient market signals to encourage energy efficiency. A couple of the interviewees feel the only way to drive holistic energy efficiency retrofit and long term payback projects is to raise the price of energy. While higher energy prices may certainly encourage more investment and development of energy efficiency retrofit projects, responders also realize that higher energy prices may also cripple an already weakened economy.

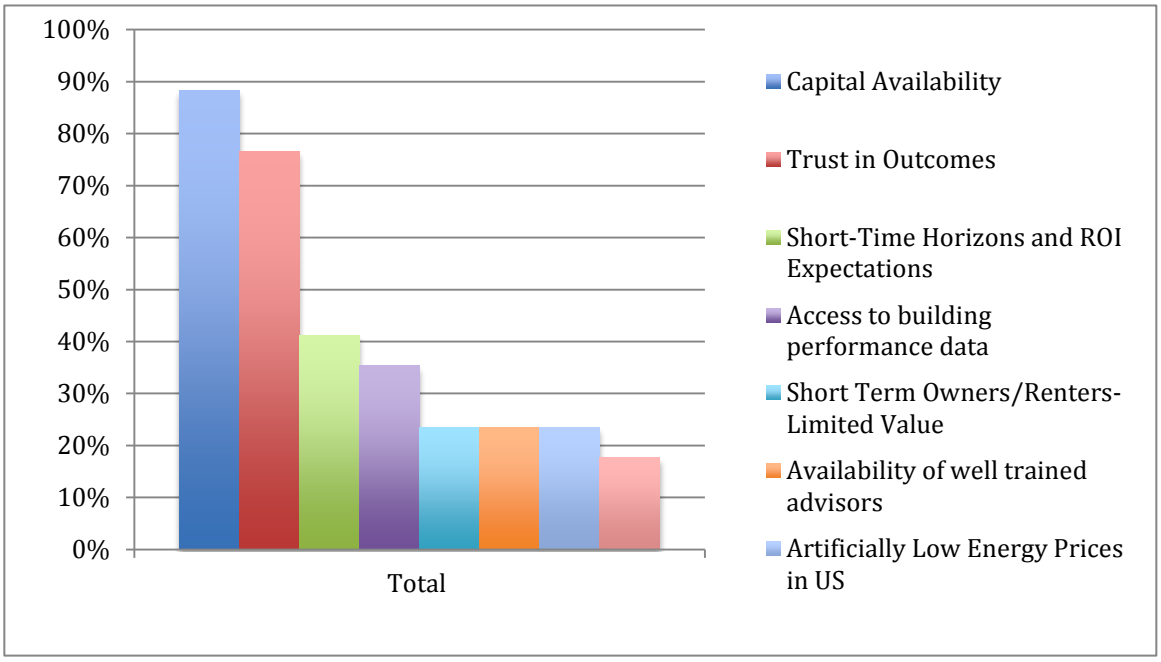
- **Potential for Renovations to disrupt customers**: Owners and operators do not want to "inconvenience" their tenants in order to implement energy efficiency retrofits. Older buildings in particular require more extensive building envelope and controls technology to improve their performance. These extensive measures require significant construction and are perceived as a barrier to existing occupants.

Other noteworthy barriers from the interviewees include:

1) Age of the building - newer facilities offer limited short-term paybacks, while older buildings require more extensive renovation
2) Lack of grants and incentives
3) Energy efficiency retrofits are often a secondary consideration of an upgrade.

The top barriers to implementing energy efficiency retrofits and their relative response frequency are shown in Figure A.

Figure A. Barriers to Energy Efficiency Retrofits



Opportunities for Improvement

The respondents identified twelve significant recommendations to improve the energy efficiency retrofit market and opportunities for service providers. Of these, the top seven were mentioned by at least three of the responders and as many as six responders.

Interviewees have recommended improvements in energy efficiency retrofits in order of declining frequency as follows:

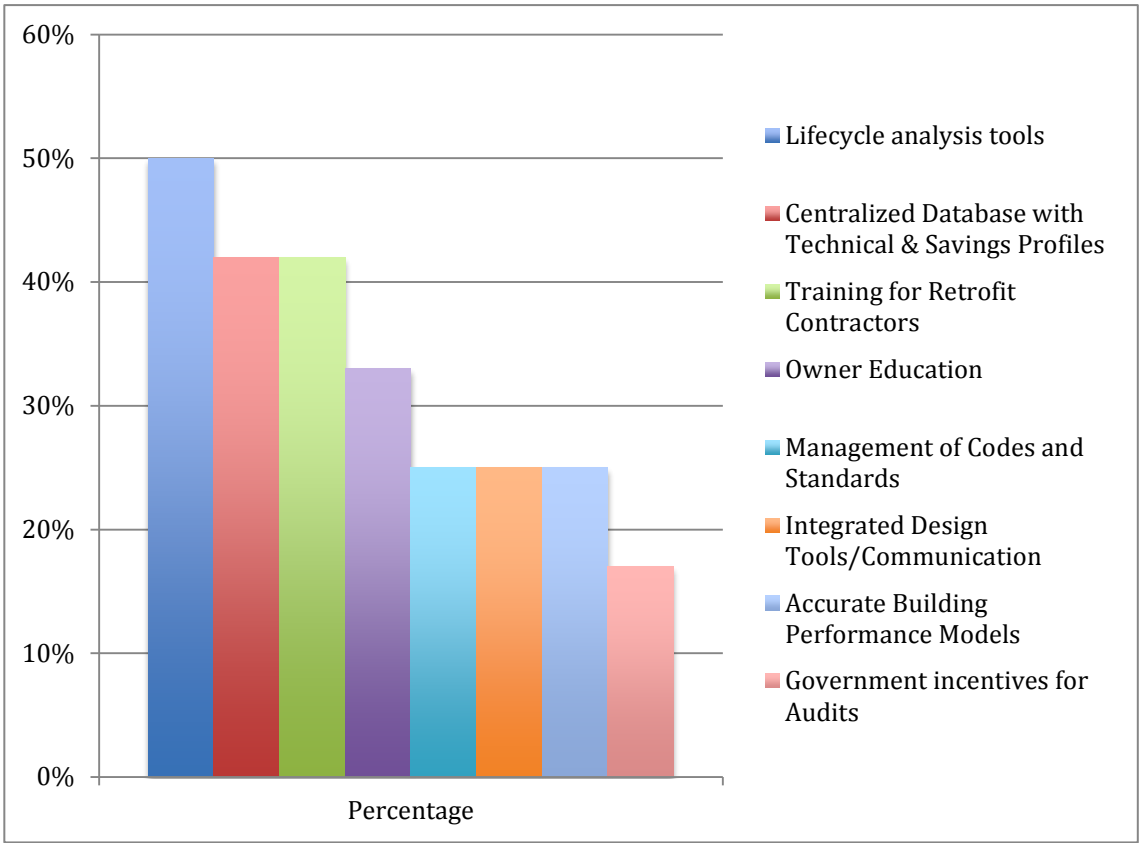
- **Lifecycle analysis tools**: The lifecycle analysis tools in use today are too complex. Interviewees are interested in life cycle analysis tools that are easy for them to use, and easy for the customer to understand. They also seek tools that are rigorous enough to enable them to look at holistic projects that may include newer technologies. Responders have varying opinions whether additional energy and/or cost analysis tools are required. However, all essentially noted that the primary cost analysis metric is straight payback, and not a net present value, long-term life cycle analysis. There was a consensus that if there were a good baseline analysis tool that is simple enough for the owner/operator to understand, that the tool would allow the building owner/operator to make better and quicker decisions.
- **Centralized Database with Technical & Savings Profiles**: Interviewees requested access to readily available examples, case studies, data and information that they can use to demonstrate the value proposition to potential clients.
- **Training for Retrofit Contractors**: Responders recommend that industry-wide training be conducted creating a broader base of competent partners from which to choose, and the opportunity to have competent energy efficiency retrofit experts throughout the value chain. Regarding contractor education, many general, electrical, and mechanical contractors have not completed retrofits and tend to revert to the "status quo" on their portion of the project. This in turn becomes a cost issue for the owner and for the engineers/architects if they have to educate the contractor while the project is being completed.
- **Owner Education**: Assist the customers in identifying energy efficiency retrofit opportunities, and highlight both the financial and intangible benefits of upgrading their facilities.
- **Management of Codes and Standards**: A few interviewees felt that building standards/codes need to be more professionally managed, and realistic expectations need to be set by certification entities. Currently the industry operates under a fragmented approach to chasing LEED points versus building science, with less than desirable results for the industry.

- **Integrated Design Tools/Communication**: Existing tools are only available to limited sectors of the industry value chain and are viewed as not adequately providing information and guidance across the value chain. Current tools do not speak to each other, nor provide sufficient output to enable those in the construction and service trades to remain true to the design, or the goal of maximizing energy savings. The interviewees recommend that consistent communication and expectations be maintained throughout the value chain.
- **Accurate Building Performance Models**: Current models do not accurately predict or model building performance. Interviewees expressed concern that building performance is not being maintained after the retrofit, citing that facility managers and service providers do not understand the metrics.
- **Promotion of short and long-term solutions:** A subset of owner education, interviewees feel that the industry does not provide or promote the benefits of adopting long- term strategies. The industry is predisposed to taking a short-term view that is hindering the proliferation of energy efficiency retrofits. Industry wide education and outreach needs to be conducted to present the value of taking on longer-term projects.
- **Government incentives for Audits**: Responders expressed interests in the government taking more proactive role in incentivizing energy efficiency retrofits. The auditing and energy consultant community in particular would like to see government tax incentives, or grants, to fund base lining of existing facilities, and to enable consultants to leverage this information to assist customers in developing and selecting energy solutions. Several responders feel that audit incentives of $5,000 to $10,000 would allow building owners to get the front-end audit completed, assisting owners and occupiers to understand long-term cost savings and move forward with a retrofit.
- **Improve feasibility for small to medium businesses**: Initial auditing expenses in mid-$20- $25,000 range are barriers to entry for small and medium-sized businesses. Current modeling solutions are too expensive and unwieldy for smaller facilities. Perhaps coordinated with the central database recommendation above, an experienced service provider base, and audit incentives, the responders are looking for solutions to enable small and medium-size businesses to participate in integrated retrofits.
- **Enhance capital infrastructure**: Responders recommend that more coordination and information be provided facilitating access to capital and incentives. There are numerous grants, funds, low interest loans, and temporary incentives that are available to customers, however they are difficult to find.

- **Coordinate project/contractor bid processes**: Current bid processes are fragmented. More coordination is required to ensure that constituents along the value chain are well versed in energy efficiency retrofit strategies and tactics.

The top recommended improvements in the energy efficiency retrofit industry and relative response frequencies are shown in Figure B.

Figure B. Opportunities for Improvement



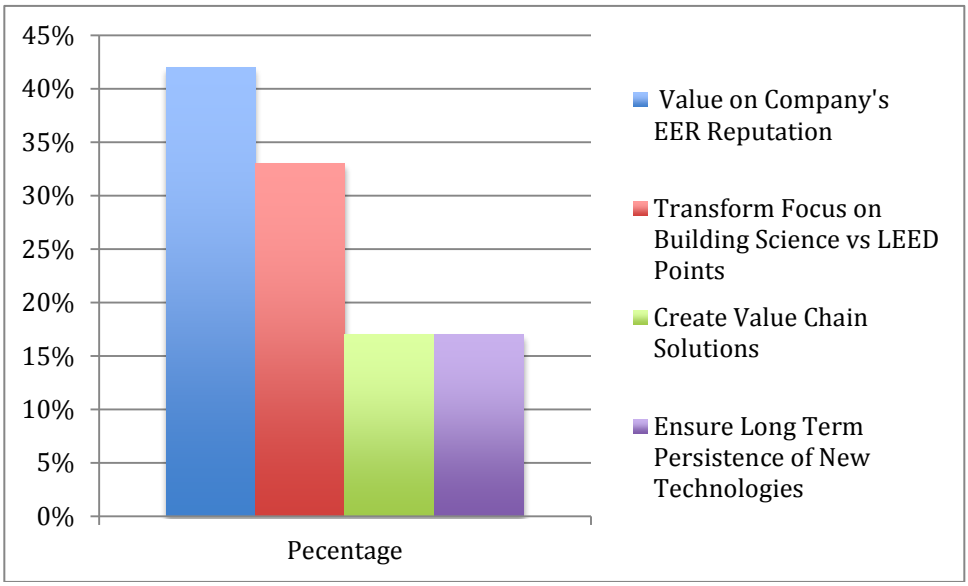
Key Implications for GPIC

The Service Provider respondents identified eight energy efficiency retrofit market issues that may have key implications for GPIC. Interviewees have identified energy efficiency retrofit market issues in order of declining frequency as follows:

- **Recognize/Place Value on a Company's EER Reputation**: GPIC should consider the promotion or establishment of metrics that enable both a building owner and operator to understand which companies obtain consistently high results with energy efficiency retrofits.
- **GPIC -Transform Focus on Building Science vs. LEED Points**: GPIC could shift the industry away from projects simply chasing LEED points, to projects that provide a holistic energy approach to their facility upgrade and that use building science as the foundation for success in an energy efficiency retrofit project.
- **Create Value Chain Solutions**: GPIC needs to take a holistic approach to marketing solutions and include all market participants in the evaluation and execution of market strategies related to the commercialization of energy efficiency retrofit projects.
- **Ensure Long Term Persistence of New Technologies**: Should GPIC choose to either include new technologies into recommendations for energy efficiency retrofits, it should consider technologies that have demonstrated long-term persistence in the marketplace. Responders expressed concerned that the equipment lifetime of new technologies may not deliver the long-term solutions the customer seeks.
- **Reduce customer acquisition costs**: GPIC should consider acquisition costs of energy efficiency retrofits in the evaluation of market potential. Avoid ROI requirements that are so stringent as to weed out potential candidates, or so difficult to explain that the upfront cost for consultants to win a project become cost prohibitive. The service providers would welcome anything that GPIC can do to streamline the customer acquisition process.
- **Impact on profit margins:** As energy efficiency retrofits become more common, design premiums will fall. As the market matures the role that GPIC has in transforming the industry may result in more projects being completed, albeit at a lower margin.

The key implications for GPIC and their relative response frequency are shown in Figure C.

Figure C. Implications for GPIC



CONCLUSION: VALUE STATEMENTS

Part of sub-task 6.6's deliverables to GPIC was to articulate business model outlines and value statements that would help to market retrofits and industry transformation. New business model outlines can be found throughout this study, after each market section where "Opportunities for Improvement" are discussed. Following are value statements that can be used to develop positive marketing stories for commercial energy efficiency retrofits.

Building Owners:

1. Commercial building owners who have undertaken energy efficiency retrofits not only lowered the energy costs of their buildings, but they found that lower energy costs increased the building 's marketability to new and existing tenants.
2. Operating a building with lower energy costs positively affected the "Net Occupancy" of the building, providing the owner with greater cash flow and a competitive advantage.
3. Building owners who have retrofitted a percentage of their portfolio of buildings have enjoyed a public relations benefit, have positioned themselves as "thought leaders in sustainability" and have gained a competitive advantage.

Investors:

1. Investors find that energy efficiency investments can provide a lower risk profile than many other types of investments.
2. Investors who have invested in energy efficiency are contributing to climate change solutions and enjoy an enhanced company image.

Service Providers

1. Service providers who are experienced in commercial energy efficiency retrofits enjoy an enhanced company reputation, which then translates to new customers and a competitive advantage.