Pacific Gas and Electric Company

Emerging Technologies Program

Application Assessment Report # 0909

Strategic Options for Increasing Energy Efficiency
in Large Office Buildings – Phase II

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Definitions

1. Customer Energy Efficiency (CEE) Department – PG&E’s department organized to deliver energy-efficiency programs mandated by the California Public Utilities Commission (CPUC) to its customers.

2. Emerging Technologies (ET) Program – A program within CEE, mandated by the CPUC, to assess and validate technology and markets for the purpose of accelerating new energy-efficiency technologies to market.

3. Marketing Delivery System (MDS) – Various organizational entities—including sales force, sales channels, and internal support groups—and their roles activities, processes, and key success factors (program resources, metrics, policies and procedures).

4. Measure – An energy-related technology or service, offered through a CEE Program to gain greater energy efficiency among its customers—either by education or with a monetary incentive or rebate.

5. CEE Program – One of the energy-efficiency programs delivered by CEE—primarily the core mass market and targeted markets, third-party, and local government partnership programs.

6. Evaluation, Measurement and Verification (EM&V) – Processes and efforts associated with conducting evaluations of California’s energy-efficiency programs by the California Public Utilities Commission (CPUC) and the California Energy Commission (CEC)


8. USGBC – The U.S. Green Building Council (USGBC) is a non-profit trade organization with more than 15,000 member organizations from every sector of the building industry.

9. BOMA – Building Owners and Managers Association (BOMA International) is a professional organization for commercial real estate professionals including building owners, managers, developers, leasing professionals corporate facility managers, and asset managers.

10. REIT – A Real Estate Investment Trust or REIT is a tax designation for a corporation investing in real estate that reduces or eliminates corporate income taxes.

11. Energy Star Program®– a program created by the US Environmental Protection Agency and the US Department of Energy to help consumers save money and prevent air pollution as described at the Internet address www.energystar.gov.

12. Property-Assessed Clean Energy (PACE)– The Property-Assessed Clean Energy (PACE) model is a financing structure that enables local governments to raise money through the issuance of bonds or other
sources of capital to fund energy efficiency and renewable energy projects. Land-secured financing districts (also known as "special tax" or "special assessment" districts) are a familiar tool in municipal finance. In a typical assessment district, a municipality issues bonds to fund projects with a public purpose such as streetlights, sewer systems or underground utility lines. The property owners that benefit from the improvement repay the bond through property assessments, which are secured by a property lien and paid as an addition to the property tax bill. Launched first in the City of Berkley, CA, in 2007, pace funding in CA is enabled by California AB-32.

13. Sustainable Solution – A marketing program name selected for piloting the Whole Product Concept with PG&E commercial customers.

14. Whole Building Project – A project that utilizes integration of demand-side management concepts, including energy conservation, efficiency, demand response, and generation and consider their integration across all energy use systems in the building.

15. Whole Product Concept – A marketing concept that integrates products and services that satisfy building owner and manager criteria for improving value in each of their roles and makes a whole building project a compelling purchase decision.
Executive Summary

Large office buildings in PG&E’s service territory use almost 20 percent of the commercial electricity and consume more than 12 percent of the natural gas delivered to commercial customers. A prior study¹ found that achieving energy efficiency alone was not sufficient to motivate decisionmakers at these facilities to invest in and adopt energy-saving measures. Instead, the research suggested that a “whole product” approach was more convincing. Based on Regis McKenna’s concept² of a whole product, an energy efficiency whole product is a generic (or core) energy efficiency product that is enhanced by whatever is needed to compel a customer to buy in.

The previous research indicated that being seen as a sustainable organization or green building has a positive impact on the value of an owner’s property or business. It also showed that bundling energy savings measures could reduce building energy use by up to 30 percent. Finally, the research also identified links to LEED-based initiatives to align energy efficiency programs with sustainability goals, but the link was not enough to spur interest in aggressive (30%+) energy savings programs.

Whole product approach
The purpose of the current study is to design and evaluate concepts that align the features and benefits of a commercial building energy efficiency program with the goals of building owners and other stakeholders involved in implementing energy efficiency projects.

Whereas the previous research defined the core product as enabling sustainability (LEED Certification) through high levels of energy savings, the whole product approach integrates business solutions with technology solutions. Traditional utility programs have focused on individual technologies as the means to save energy in buildings. The whole product approach would include business services such as design and engineering support, financing, sustainability, and real estate value enhancement.

In a whole product program, the utility’s role expands from technical resource to business solutions advisor, providing building owners and engineers with leadership and program support. Throughout a whole product engagement, utilities:

- Take the lead with engineering, financing, and program design to bring building owners a total solution meeting efficiency, sustainability, and economic needs.

• Coordinate and offer LEED design expertise to assure owners that the solutions maximize energy efficiency opportunities.
• Provide owners with access to the most efficient technologies to improve the performance of new energy efficiency investments.
• Take the lead in helping owners develop performance contracting vehicles and relationships that reduce the owner’s implementation risk.
• Design incentive programs that support continuous efficiency improvement, perhaps by paying out incentives over time, based on performance.

Methodology
During the project, interviews were held with industry experts and decision makers in the commercial building market. Whole product features were presented as well as analyses of current developments in sustainability and energy efficiency. This resulted in the identification of three requirements for a successful whole product program:

1. Utilities must expand their view of energy efficiency to encompass its impact on sustainability.
2. Financing barriers must be lowered.
3. The utilities’ role must grow beyond solely energy consulting and incentives to prime mover in providing whole products to customers.

In the current study, we explored how Pacific Gas and Electric Company (PG&E) can meet these requirements, tested potential concepts with building owners and other stakeholders, and outlined an approach for developing a whole product program.

To be successful, PG&E's program must provide measureable value to building owners. During this project, a valuation model was created that shows the possible increase in building value that is generated from transforming wasted energy into investments in energy efficiency and LEED certification. This model shows that owners can increase the value of their buildings without any upfront cost.

PG&E's Sustainable Solution
To communicate its value effectively to customers, we propose that PG&E name its whole product, “PG&E's Sustainable Solution.” Referring to it as “PG&E's” shows PG&E’s expertise in promoting this solution and that PG&E acts as a single point of contact. The term "sustainable solution" reflects the value that customers place in sustainability.

Table 1 provides examples of whole products that could be created by combining existing PG&E energy efficiency products with new components to satisfy the business needs of building owners and tenants.
In the near term, the most attractive value proposition emphasizes sustainability, combines energy efficiency benefits with the value of LEED certification, and seeks to quantify these benefits to increasing property value. This whole product approach can evolve over time to incorporate conservation, demand response, on-site generation, renewable energy, and emerging technologies such as advanced meters, building controls, and monitoring.

The final result is a complete integrated demand-side management approach that advances the longer-term goal of zero net energy buildings.
<table>
<thead>
<tr>
<th>Element in Current PG&amp;E Program (core product)</th>
<th>Potential New Component</th>
<th>Whole Product Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ENERGY STAR™</td>
<td>• Define, measure, and promote value impact of sustainability on building value</td>
<td>• Valuation of energy efficiency in buildings</td>
</tr>
<tr>
<td>• Efficiency audits</td>
<td>• Sell energy efficiency at building owner level (not operations level)</td>
<td></td>
</tr>
<tr>
<td>• Emerging Technology consulting and demonstration sites</td>
<td>• Test and use CCI or other best valuation tools</td>
<td></td>
</tr>
<tr>
<td>• CEE large customer programs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Direction on optimizing utility rebates and incentives</td>
<td>• Long-term efficiency implementation plan</td>
<td>• Energy efficiency consulting</td>
</tr>
<tr>
<td>• Program support for incentive capture (ET support)</td>
<td>• Long-term technology consulting</td>
<td></td>
</tr>
<tr>
<td>• Incentives based on building energy efficiency</td>
<td>• Integrated self-generation, EE, and conservation strategy</td>
<td></td>
</tr>
<tr>
<td>• Program support for different levels of audits (including investment grade) and LEED certification</td>
<td>• Incentives linked to portion of energy savings opportunity captured (the higher the percent of the available savings captured, the greater the incentive)</td>
<td></td>
</tr>
<tr>
<td>• Referral to third-party financiers</td>
<td>• EE project financing</td>
<td></td>
</tr>
<tr>
<td>• Future availability of on-bill financing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• PACE financing option</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Support for use of stimulus funds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Project managers for turn-key program design and implementation</td>
<td>• Project implementation</td>
<td></td>
</tr>
<tr>
<td>• Possibly ESCOs as service providers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Possibly contracting and project management assistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Tools to help manage implementation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• References to ESCO services</td>
<td>• Efficiency performance verification</td>
<td></td>
</tr>
<tr>
<td>• Baseline methodologies and services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Retro-commissioning and diagnostic measurement services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• LEED certification measurement and services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ET development of combined micro-metering and control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• BOMA sub-metering initiatives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Data center energy efficiency measures</td>
<td>• Support for energy efficiency measures in data centers</td>
<td>• Carbon credit support</td>
</tr>
<tr>
<td>• Program for commercial customers</td>
<td></td>
<td>• Green Energy Credits</td>
</tr>
</tbody>
</table>

Table 1 – Potential Elements of a Whole Product
Project Objectives

The purpose of this research was to design a whole product that aligns the features and benefits of a utility energy efficiency program with the goals of building owners who make large-scale energy efficiency investment decisions. The research had four main objectives:

1. understand property value and sustainability as value propositions
2. evaluate strategies for delivering these value propositions;
3. refine the definition of a whole product for the large commercial buildings;
4. create tools and establish business relationships to support testing of these new concepts.

The first step to understanding the sustainability value proposition was to gain an understanding of how customers currently view sustainability. Sustainability issues and criteria continue to develop and evolve in the commercial sector, and the impact of these sustainability trends on energy efficiency measures was studied for commercial buildings. The assessment considered sustainability’s impact on technical features of a measure and its impact on marketing strategies, including channel options to deliver the value proposition to target markets. The target markets considered in this project included large commercial offices, educational facilities, and government offices.

“Whole-building” products are broadly defined as an interrelated set of technologies and services that can optimize a building’s energy usage, operating costs, and functionality. The project used whole-building capabilities as one element of a whole product that identifies specific product features (technical and service) needed by large property owners to carry out large, integrated energy-saving projects. These features were tested on five PG&E customers.

The recommended elements of the whole product to be included in a pilot offering were driven by this customer research. This research, market tests, and the capabilities of PG&E’s marketing channels refined marketing strategies for the whole product.

The whole product concept was based on leveraging the combined values of LEED and energy efficiency as shown in the table below. This describes the value of a LEED-based energy efficiency program, which serves as a starting point for this project.
<table>
<thead>
<tr>
<th></th>
<th>Stand Alone Energy Efficiency Measure</th>
<th>Whole Building Energy Efficiency within a LEED Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Efficiency Benefits</td>
<td>Potential Energy Savings</td>
<td>Delivers points required for LEED, which increases building value / brand value, potentially including energy savings benefits</td>
</tr>
<tr>
<td>Operational Value</td>
<td>Engineering staff is spread thin and lack skills or experience to execute complex energy efficiency projects</td>
<td>Top driven LEED projects increase the visibility and funding priority of energy efficiency activities.</td>
</tr>
<tr>
<td>Performance Value</td>
<td>Past projects have not had ongoing measurement to demonstrate savings were achieved</td>
<td>LEED has requirements and processes for ongoing measurement – which also drives operational performance</td>
</tr>
<tr>
<td>Financial Value</td>
<td>Energy savings create a positive cash flow to pay back investment in an energy efficiency project. Projects, however, compete for limited funding with other corporate initiatives.</td>
<td>Whole building projects that include an energy efficiency component use energy savings to pay for the energy efficiency retrofits plus LEED certification. LEED value may result in acceptance of longer paybacks for an energy efficiency project.</td>
</tr>
</tbody>
</table>

**Table 2 – Value of Whole Product Energy Efficiency Programs**

To communicate the value proposition to the various stakeholders both during this research and in a future pilot test, presentation materials and descriptions of target customers and potential channel partners were developed. The presentation materials embody the product features and value proposition, enable the testing of the concept, and help develop relationships with potential pilot customers.

Another outcome of this project was the creation of a database of potential pilot host sites and product partners who can either offer services and products to support the whole product program concept or act as channel participants in bringing the whole product concept to market.
Market Overview

Large office buildings in PG&E’s service territory use almost 20 percent of the commercial electricity and consume more than 12 percent of the natural gas delivered to commercial customers. Building energy inefficiencies -- often resulting from aging, poorly maintained buildings and outdated, less efficient equipment -- create a significant energy savings opportunity. One scenario shows a maximum attainable energy savings of 30 percent of current use in 2015 and 50 percent in 2030. PG&E’s portfolio of energy efficiency measures is currently capturing 2-3 percent per year and cumulatively up to 13 percent of the total potential energy saving opportunity by 2015 in large commercial office buildings with much of this coming from efficient lighting retrofits.3

PG&E’s commercial building stock is very diverse: large offices, retail, and non-refrigerated warehouses comprise approximately half of the total commercial floor space. Large office buildings are the largest individual segment in the market. There are more than 30,000 commercial office buildings in PG&E’s service territory, with an estimated total floor space of 430 million square feet. About 1,500 buildings make up 4 percent of the building count and two-thirds of the floor space.

The structure of the commercial office building market can be described by 1) building ownership, 2) building occupancy patterns, 3) building service activities, or 4) building size, age or function. An important market characteristic from an energy efficiency decision-making standpoint is ownership structure. Building owners make decisions based on how each individual property contributes to the economic value of their overall business enterprise.

The first phase of this research project showed solid evidence that the market is aware of the value of energy efficiency, but pointed out barriers to the broad and deep implementation of energy efficiency measures. These barriers are a result of:

- Owner/investor short-term outlook;
- The owners’ lack of belief in savings estimates;
- Capital constraints where energy efficiency has to compete with all other internal investment opportunities for capital;
- Owner/tenant cost vs. benefit complexity, i.e., lack of alignment between who pays and who benefits from energy efficiency investments.

Decision making for large-scale energy efficiency investments is complex and many of the drivers are interrelated. The most significant conclusion from previous research is that the various organizational goals surrounding a building’s energy efficiency are misaligned in ways that result in suboptimal

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3 Emerging Technologies, op. cit. p1
decision making behaviors. These behaviors create barriers to comprehensive and long payback energy efficiency projects and limit the energy savings potential. The economic incentive to be energy efficient is significant for quick payback measures, but energy efficiency’s link to sustainability, climate change, and LEED certification needs to be prominent in broad, long payback efficiency measures to attract building owners’ consideration. There is a market opportunity in this time of increased awareness of climate change and carbon constraints to integrate financial and sustainability tools with energy efficient technologies and accelerate the penetration of PG&E’s energy efficiency programs.

Whole Product

The market trends and drivers that influence energy efficiency decision makers in large commercial office buildings has been shown in a prior research study⁴. The study results showed that for these decision makers, energy efficiency alone is not enough to justify significant behavior changes or investment in energy-related infrastructure. The research did show, however, that being seen as a sustainable organization or green building has a positive impact on the value of an owner’s property or business.

This prior study introduced the concept of aligning utility energy efficiency measures with building owners' goals. The whole product is built on the concept of delivering a total solution to the owner. The near term value proposition has been designed around the market’s goals for sustainability through LEED certification. Over the long-term, a whole-product sustainability approach can be coupled with emerging technologies, on-site generation opportunities, and other demand-side measures to achieve the goal of a zero net energy commercial building.

Whole Product Value Proposition

Sustainability and LEED certification are most often corporate-driven activities, affecting occupant behavior (e.g. paper recycling), building operations (e.g. water conservation) and facilities management (e.g. LEED requirements in tracking performance). LEED certification has a compelling value proposition for the building owner as well the building manager and occupants.

<table>
<thead>
<tr>
<th>Participant</th>
<th>LEED-Based Whole Product Value Proposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>Meets sustainability commitments and:</td>
</tr>
<tr>
<td></td>
<td>• Improves property value</td>
</tr>
<tr>
<td></td>
<td>• Improves productivity</td>
</tr>
<tr>
<td></td>
<td>• Improves rents</td>
</tr>
<tr>
<td></td>
<td>• Improves Image</td>
</tr>
<tr>
<td></td>
<td>• Reduces costs</td>
</tr>
</tbody>
</table>

⁴ Ibid. p.8
<table>
<thead>
<tr>
<th>Property Manager</th>
<th>Results in a more competitive space to lease:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Reduces costs</td>
</tr>
<tr>
<td></td>
<td>• More attractive property</td>
</tr>
<tr>
<td></td>
<td>• Easier to rent and keep rented</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Facilities Manager</th>
<th>In return for the effort to attain certification, facility management organization satisfies the needs of the client and will be recognized by the owner and potential tenants as having a superior building.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Services (internal or outsourced)</td>
<td>In return for supporting the effort to attain certification, engineering contractors will satisfy the needs of the client and be recognized by the owner and potential employers as having a superior building</td>
</tr>
<tr>
<td>Tenant</td>
<td>Meets sustainability commitments and:</td>
</tr>
<tr>
<td></td>
<td>• Meets corporate sustainability goals</td>
</tr>
<tr>
<td></td>
<td>• Improves Image</td>
</tr>
<tr>
<td></td>
<td>• Improves productivity</td>
</tr>
<tr>
<td></td>
<td>• Reduces costs</td>
</tr>
</tbody>
</table>

Table 3 – LEED-Based Whole Product Value Propositions

The LEED value proposition can be leveraged to influence organizational and cultural changes necessary for increasing the energy efficiency of office buildings. Energy efficient technologies, both existing measures and emerging technologies, can be components of a LEED certified building. An energy efficiency value proposition within a LEED value proposition creates synergies that make energy efficiency measures more attractive than when they stand alone. While LEED certification opens the door to greater energy efficiency penetration in commercial buildings, owners may have to accept longer payback periods. For this reason, the initial whole product concept has been designed to include innovative financial solutions such as financing and energy performance contracts to overcome some of the barriers associated with longer paybacks.

Whole Product Development

"Whole product" is a marketing term defined as a core product augmented by whatever is needed for the customer to have a compelling reason to buy. From PG&E’s perspective, energy efficiency information and incentives for commercial buildings is the core product, and the whole product includes items such as audits, purchasing and implementation support, financing, property valuation, and LEED certification. When combined, this combination of energy efficiency measure plus business support results in a compelling value proposition.

This value proposition is both operational and economic. It is operational because the owner is provided a start-to-finish “total solution” from a trusted supplier (PG&E) that identifies and implements the opportunity and measures its performance. It is economic because it includes measurements of the projected impact on the owner’s building value and cash flow.
Property Valuation

As shown in Table 3, increasing property value is a key value proposition of the whole product. The valuation model developed in this work is critical to communicating the value of PG&E’s Sustainable Solution (PG&E’s whole product program) to building owners. The model translates the value of energy efficiency and LEED certification to financial value. Figure 1 shows these linkages.

![Diagram showing Operational and Financial aspects]

- New and more efficient equipment / technology
- Lower utility bills
- LEED certification
- Improved air quality, productivity, recruiting value
- Increased value of building

- Financed through city / utility special purpose funding
- Paid for by energy savings
- No upfront cash outlay
- Tax deduction for energy improvements
- Boost Operating Income, Return on Assets and Building Value

Figure 1 – Sources of Value by PG&E’s Sustainable Solution

The attractive features of this financial value proposition are that energy savings pay for all operational improvements, and that an external source of capital supplements or replaces the owner’s traditional capital budget for energy-related infrastructure investments. When municipal financing, such as PACE, or performance contracts supply the funds for improvements, there is no upfront cash outlay needed by the owner. Additional tax benefits from depreciation allowances and tax credits for the efficiency investments further increase this financial value. The net result for the owner is higher operating income and increased return on assets.

**Example of whole product’s effect on building value**

The following calculation shows the impact of a whole product on building value. This analysis considers a hypothetical one million square foot building that undertakes energy efficiency retrofits that save 30 percent of the energy bill.

Using available BOMA data, this building would consume $2.20 per square foot in energy expenses. The retrofit program is assumed to reduce energy costs by 30 percent resulting in total annual benefits of $660,000. This cash flow is sufficient to repay a building retrofit worth $3.5 million dollars given a financing rate of 8 percent and a seven year term.

Following the retrofit, tenant operating costs would be lowered by $0.66 per square foot. This savings can be used as the source of cash for paying off the
loan. Tenants, therefore, would not see any reduction in their costs until after year seven when the loan is paid off.

Energy efficiency and LEED retrofits provide benefits that increase building value according to a number of studies, including the USGB study, “Quantifying Green Value; Assessing the Applicability of the CoStar Studies.(Ref. 8)” This research has estimated the increase in building value that the owner would realize and provides more conservative savings estimates than the original CoStar study. The valuation model developed under this project uses inputs from this study; (1) an increase in rental rates amounting to $2.40 per square foot, and (2) an increase in building occupancy that equates to an incremental value of $1.04 per square foot. At a capitalized value of 8 percent, these benefits increase in building value by $43.38 per SF.

This analysis has not included the value of efficiency incentives that PG&E offers today or the tax consequences of improving the operating cash flow of a facility. It is anticipated that any increase in taxes would be at least offset by a one-time tax credit of up to $1.80 per square foot.

<table>
<thead>
<tr>
<th>Operational Benefits</th>
<th>Financial Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Annual Energy Bill at average BOMA utility rate of $2.20/SF: $2.2M</td>
<td>• City provided $3.5M funding paid for by a 7 year special tax assessment of $660K (at 8%)</td>
</tr>
<tr>
<td>• Whole Building Audit: 30% Energy Saving</td>
<td>• Owner recognizes $3.5M in assets and liability on books</td>
</tr>
<tr>
<td>• Annual Energy Bill Savings: $660K</td>
<td>• No impact to tenants as taxes go up by $660K and Utility Bill goes down by $660K (for 7 years)</td>
</tr>
<tr>
<td>• New and more efficient equipment / technology worth $3.5M</td>
<td>• For 7 years, owner recognizes:</td>
</tr>
<tr>
<td>• Lower tenant costs of $.66 per sq ft starting in year 8</td>
<td>• Additional revenue of $660K</td>
</tr>
<tr>
<td>• LEED certification results in higher rental rates (by $2.40 SF) $1 and higher occupany (equivalent to $1.04 SF) $1</td>
<td>• Additional depreciation of $500K (at 7 year straight line schedule)</td>
</tr>
<tr>
<td>• Increased building value of $43.38 per SF at an 8% capitalization rate $11</td>
<td>• Increased Income of $160K, increased tax due of $64K (at 40%)</td>
</tr>
<tr>
<td></td>
<td>• $3.5M improvement achieved with just annual $64K cash outlay for 7 years</td>
</tr>
<tr>
<td></td>
<td>• Potential $1.8M one time Energy Tax deduction (at $1.80 / SF) more than offsetting any out of pocket expenses</td>
</tr>
</tbody>
</table>

† USGBC study, “Quantifying Green Value; Assessing the Applicability of the CoStar Studies
†† This is within the CoStar range of $24 to $171 /SF increased building value

Figure 2 – Financial Benefits of a Whole Product Sustainable Solution for a 1 Million Square Foot Building

The example in Figure 2 shows the potential of using energy savings to finance improvements that increase the building’s value. The pilot program will test the assumptions that go into this model and confirm that this value proposition looks economically compelling from an owner’s perspective as well as feasible from an investor’s and utility’s perspective.
This value proposition will exist if PG&E can deliver the features listed in Table 4 of the whole product concept. From this economic modeling, it is possible to create a project cash flow scenario for owners interested in PG&E's Sustainable Solution. The table below summarizes this program.

<table>
<thead>
<tr>
<th>Features</th>
<th>Elements</th>
<th>Tools and Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunity Assessment</td>
<td>• Valuation of energy efficiency in buildings</td>
<td>PG&amp;E leads the building owner through an evaluation process resulting in a decision to implement a whole building project. The prospective customer receives information on availability and performance of energy efficient technologies. A preliminary energy audit by PG&amp;E uncovers energy saving opportunities. This step also provides financial valuation of the impact of energy efficient technologies, financing options, and sustainability using tools such as Real Win-Win and EPA’s Building Upgrade Value Calculator. PG&amp;E coordinates LEED certification assessment, providing information and support for LEED Accredited Professional recommendations, contributing potential innovation points with PG&amp;E emerging technologies, and linking the value of higher LEED certification to the project valuation.</td>
</tr>
<tr>
<td>Technology solutions</td>
<td>• Energy efficiency consulting</td>
<td>Energy efficient technology contributes to satisfaction of the building owner’s need to reduce operating costs and building certification. Building managers respect the technical expertise of PG&amp;E and rely on them for advice in selecting technology solutions. PG&amp;E’s energy efficiency consulting services provide in-depth knowledge of efficiency measures on which they pay incentives and information on emerging technologies. These services assist in the design of a whole building project and the achievement of optimum energy efficiency credits in LEED certification. PG&amp;E’s retro-commissioning and diagnostic measurement services validate the energy savings potential of the project and enable the implementation of low-cost or no-cost measures.</td>
</tr>
<tr>
<td>Financing solutions</td>
<td>• Energy efficiency project financing</td>
<td>There are many different financing models and funding sources with which to pay for the whole building project. Some upcoming, innovative financing options include tax-bill financing and utility-bill financing. The PG&amp;E role is to educate the customer on these options and provide referrals to third-party financiers. Government funds, utility incentives, tax credits, and carbon credits can provide cash flows to offset project costs and improve project economics. PG&amp;E has the expertise to assist in obtaining appropriate utility rebates and incentives.</td>
</tr>
<tr>
<td>Project management support</td>
<td>• Project implementation</td>
<td>An energy service company (ESCO) or engineering contractor will install the lighting, space conditioning, building shell, and controls upgrades to achieve the technical goals of the project. PG&amp;E can be an independent resource to the building</td>
</tr>
</tbody>
</table>
Performance Management

- Efficiency performance verification

Performance management includes monitoring, measurement, and analytical activities to ensure that energy efficiency performance is maintained over the long term, that the project pays the expected return on investment, and that sustainability objectives have been achieved. Energy service contracts and some financing options have performance guarantees requiring verification. LEED certification and Energy Star building ratings require periodic verification of performance to maintain the building’s status. Utility incentives and some government funding are granted with the condition of performance verification. PG&E’s auditing, commissioning, measurement, and efficiency consulting expertise allow PG&E to provide credible verification services. Access to customer meter data and other baseline information is an important asset for performance measurement. Continuous commissioning is an option for maintaining performance and certifications and monitoring progress towards achievement of a long term efficiency implementation plan.

Table 4 – Whole Product Features

Whole Product Validation

Research

Research during this phase explored the viability of the various elements of the whole product concept and the utility’s role in delivery of the product. The following sections summarize feedback from stakeholders and present refinements to the whole product concept. Research methodologies included primary research (formal interviews with stakeholders and conference attendees) and secondary research (literature on sustainability, green marketing, energy efficiency financing, and commercial real estate trends).

Feedback on the whole product approach has been favorable. Customers want to improve the financial viability of energy efficiency projects. They also want the utility to act as a quality assurance single point of contact. While customers do not require PG&E to act as contractor, they want PG&E to refer qualified vendors who stand behind their work, possibly even offering performance guarantees. As one conference attendee said, “We (the industry) need certified, qualified
vendors and then needs to require and reward the delivery of integrated packages that go deep into building savings.”

Research at Leading Conferences
Throughout this project, the research team stayed abreast of the most current findings and recommendations for sustainability, green financing, energy efficiency retrofits for commercial buildings, LEED, and evaluation and measurement for commercial building programs. The following industry conferences were attended during this research, and contributed to the design and validation of the whole product concept.

- Infocast: March 2, 2009 Conference; Green Building Finance & Investment Forum West
- Infocast: April 20, 2009 Webinar; The New Energy Financing Mechanisms Created by ARRA Status and Outlook for Game-Changing Structures
- BOMA: July 14, 2009 Webinar; Valuing Energy Enhancement Projects and Financial Returns
- Commercial Real Estate Development Association – NAIOP: August 13, 2009 Webinar; Going Green: Tips, Tools and Examples from the Field
- McGraw-Hill Construction: October 21-22, 2009 Conference; Green Retrofit – Changing the Landscape of Existing Buildings
- Financial Research Associates: November 16-17, 2009 Conference; City and County Clean Energy Financing Program

Literature Review and Secondary Research Highlights
Key reports that were particularly useful in clarifying sustainability issues and defining financing options are listed in the References of this report. The following section summarizes key insights that have been gained from the secondary research.

Sustainability as a Driver to Energy Efficiency Investments
Sustainability is now a recognized driver in the decision making process of many companies, as indicated by the following comment:.

“………..sustainability as an issue is here to stay, but companies are increasingly aware of the commercial realities,” said Dan Proust, Chairman of

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Energy and Sustainability at Jones Lang LaSalle. “It is no longer enough to simply be ‘green’; organizations want to see the benefits to the bottom line.”

Recent publications and conference presentations show that businesses that an increasing interest in sustainability and underscore the interrelationship of sustainability and energy efficiency. A study by the National Association of Industrial and Office Properties (NAIOP)\(^7\) has noted a 400 percent increase in LEED registered projects over the last five years with nearly 25,000 projects registered in the last six months. Green building investments are projected to grow at an annual rate exceeding 50 percent per year according to this research and it is expected that American Recovery and Reinvestment Act (ARRA) funding for energy projects will be a major contributor to these projects. According the NAIOP study, 40 percent of real estate professionals say that sustainability has become more significant for them in 2009, despite the recession. One measurable benefit of sustainability that industry cites is the savings generated by energy efficiency.

Corporate real estate (CRE) executives, whose companies lease and own significant amounts of office space, increasingly consider sustainability when making renting and investment decisions, according to the 2009 Coronet Global and Jones Lang LaSalle sustainability survey\(^8\).

- 70% consider sustainability is a critical business issue.
- 89% consider sustainability in their location decisions.
- 41% always consider green building certifications.
- 46% consider energy labels.
- 74% are willing to pay a premium to retrofit owned space to meet sustainability criteria.
- 21% would only pay more rent for sustainable space if offset by lower operating costs (8% expect to pay less and 34% the same)
- 37% rank energy costs as the most important sustainability measure (followed by 29% who cited employee health and productivity)
- More than 50% think sustainability performance measurement is an extremely difficult challenge.

Owners of tenant occupied buildings are also cautiously eyeing the benefits of sustainability. USGBC studies indicate that green buildings result in higher valuation than their traditional counterparts, and that energy efficiency-related

\(^6\) The global survey of 231 corporate real estate executives was conducted by Jones Lang LaSalle and CoreNet Global in September and October 2009 and a copy of a summary report is available at http://www.joneslanglasalle.com/pages.SustainabilityResearch.aspx
\(^7\) Going Green: Tips and Tools and Examples from the Field. March 2009. Prepared for and funded by the NAIOP Research Foundation (The Commercial Real Estate Development Association)
\(^8\) Jones Lang LaSalle and CoreNet Global survey
cost savings and green buildings allow building owners to better compete for tenants and capture higher rents.

**Financing as a Driver to Energy Efficiency Investments**

Financing, which addresses the cost and availability of money to finance a project, is also an important factor in making decisions for energy efficiency projects. Like sustainability, however, it is not the only determinant of a decision. Fundamentally, the financing of an energy efficiency project has the same components of the financing of any asset purchase as first described by the Energy & Resources Group US Berkley (ref5).

<table>
<thead>
<tr>
<th>Sources of Capital</th>
<th>Financing Mechanism</th>
<th>Collection Mechanism</th>
<th>Enhancements</th>
<th>Eligible Measures</th>
<th>Underwriting Criteria</th>
<th>Security Interests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who provides the capital that will be used in the loan?</td>
<td>What is the structure of the loan?</td>
<td>How are the loan payments collected?</td>
<td>What enhancements can be made to make the loan more attractive to the borrower or lender?</td>
<td>What can the loan be used for?</td>
<td>What criteria are used to issue the loan?</td>
<td>What, if any, security does the lender have if the loan defaults?</td>
</tr>
</tbody>
</table>

Table 5 – Components of Debt Financing Process

This research examines a number of financing models that tailor these components to best meet the requirements of the building owner and the lender. These financing options can be grouped into “public” and “private” options.

Public financing options include municipal bonds and municipal short term financing. Bonds can be taxable or tax exempt, with federally tax exempt bonds being about one-third less expensive than taxable bonds. There are special bonds available to encourage investments in measures such as solar retrofits, affordable housing, and energy conservation. Property Assessed Clean Energy (PACE) bonds are taxable municipal bonds that may have application in the whole-product concept. PACE bonds are backed by property tax liens on the borrower’s property, enabling repayment of the bonds even if the property changes hands.

Private financing options include a line of credit from bank or other lender, mortgage or mortgage refinancing, equipment lease, internal funds, or energy performance contracts. Utility incentives can also be considered a source of private financing when they offset the purchase price of energy efficient equipment through rebates.

Appropriate financing options will depend on the type of organization (public or private), size and complexity of a project, internal capital constraints, and other

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Strategic Options for Increasing Energy Efficiency in Large Office Buildings – Phase II 17
factors. Financing methods are not mutually exclusive: a building owner may use multiple sources when appropriate.

Financing of projects in private buildings is impacted by the ownership structure of a building. Owners of multi-tenant buildings often form a separate corporation for the purpose of owning that building. These owners have a debt obligation tied to their specific building (tied to a separate LLC for the building) and must acquire the approval of the primary mortgage holder to incur a new debt for the building beyond that which has already been approved. Owners of owner-occupied buildings may fund projects internally, as they may not have individual debt obligations tied to specific buildings. Instead, they have a capital budget for all capital investments of the corporation. This budget may be allocated to broad areas of investment, and then individual business operations managers will make decisions based on their specific property needs. The business operations managers also need approval to use any other sources of funding.

**PACE Financing**

Tax lien financing is a new vehicle with benefits for both multi-tenant and owner-occupied buildings. Tax lien financing is debt financing that is provided on behalf of a government (generally municipal or city agency) and backed by the property tax bill. California state law has made tax lien financing available, and San Francisco has instituted a program to use this vehicle.

With tax lien financing, the lender lowers the risk of losing money on the loan. PACE provides lenders with sufficient repayment security through the priority of the tax lien on the property. At property sale, the assessment stays with the property, not the owner.

PACE financing is very new in the commercial sector. Renewable Funding, the developer of the San Francisco program, is offering PACE financing to commercial building owners, but the final design of the structure and source of the financing are still in process at the time of this report. The benefits of tax lien financing to building owners include:

- Removes the “first cost” barrier of energy projects by empowering owners to arrange financing by leveraging the property through the tax system.
- Encourages longer term projects since owners with quick turnover have a means of passing along the unamortized balance to future owners.
- Minimizes the “split incentive” barrier of non-occupying owners who utilize net lease agreements, since property assessments qualify as “pass-through” expenses, subject to certain conditions.
- Lower interest rates, which makes the project more economically viable.
Funds that support tax lien financing come from public and private sources. For commercial building projects, owner-arranged financing is also possible. In an owner-arranged approach, individual property owners have the choice of receiving funds through a taxable bond issued by the city or arranging their own financing from a commercial lending source on the terms, scale, and schedule that best suits their project.

There are many advantages to owner-arranged financing over municipal bond financing. Advantages to the owner include:

- Negotiating more advantageous terms, depending on the credit-profile of the property.
- Accelerating the flow of capital and implementation of projects.
- Enabling execution of an energy performance contract, bundling energy services and financing, and permitting the transfer of credit risk of the contractor to the commercial lender.

Although relatively new in the commercial sector, energy performance contracts are specialized financing sources that could appeal to specific building owners. Under an energy performance contract, an energy service company (ESCO) provides a service package that typically includes the design and engineering, financing, installation, commissioning, and maintenance of energy efficient equipment. Performance contracts have traditionally been used by government owned or operated buildings, but it is anticipated that PACE financing will make this approach more attractive in the commercial sector.

Off-balance sheet financing has been discussed as an option in the energy efficiency projects and energy services contracts. In off-balance sheet financing, investors make loans based on the projected or guaranteed energy savings that result from an energy efficiency retrofit. Off-balance sheet financing typically appeals to companies that do not want to execute capital improvement projects out of their existing capital budgets. Off balance sheet financing is not a capital lease. The contract structure is an energy savings agreement, and the financing firm owns the agreement. They provide the money in exchange for owning the equipment. An ESCO installs and maintains the equipment, while the host owns the building. Off-balance sheet transactions have greater security risk for the lender, and as such the lender needs to be guaranteed of being paid back in other ways. One of the barriers to overcome is the transaction costs, which limit off balance sheet financing to large projects.

The Department of Energy’s Federal Energy Management Program (FEMP) guides federal acquisition of energy performance contracts. FEMP has developed a series of Energy Service Performance Contracts (ESPCs) to standardize and streamline the performance contracting process. In the performance contracting process, the ESCO conducts a comprehensive energy audit and identifies improvements that will save energy at the facility. In
consultation with the agency customer, the ESCO designs and constructs a project that meets the agency's needs and arranges financing to pay for it. The ESCO guarantees that the improvements will generate savings sufficient to pay for the project over the term of the contract. After the contract ends, the value of additional energy savings accrue to the agency. Contract terms up to 25 years are allowed.

FEMP has also developed Super ESPCs to speed up the performance contracting process. These are "umbrella" contracts with ESCOs who demonstrated their capabilities to provide energy projects to federal customers. Certain FEMP processes and resources may be applicable to the whole-product concept.

Utilities participate with FEMP in the delivery of ESPCs to federal facilities through Utility Energy Service Contracts (UESC). PG&E participates in this effort.

UESC is a program offered by PG&E that is a utility-provided ESPC to federal agencies. PG&E offers turnkey services that include comprehensive energy audits with detailed feasibility studies and investment-grade audits, project development, project management, and financing assistance. In addition to more streamlined procurement processes, government agencies who participate in the PG&E UESC Program benefit from flexible solutions that can be structured to consolidate the management of many contacts and individual service providers into a single point of contact with full oversight capabilities. The types of service providers included in a UESC Program depend on the specific project needs and may include:

- Project Management
- Financing (from a third party financier)
- Engineering and Design
- Contract Administration
- Construction and Installation
- Risk Management
- Investment-Grade Energy Audits and Studies
- Measurement and Verification

Features of PG&E’s UESC program and a comparison with those of a conventional service provider contractor are summarized in the table below.

<table>
<thead>
<tr>
<th>Intent of purchase:</th>
<th>Energy Service Provider Contract (ESPC)</th>
<th>PG&amp;E’s UESC Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Capital outlay for new energy efficient equipment or renewable energy source</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td><strong>2. Comprehensive service—</strong> dedicated power for a specific facility or activity</td>
<td>No initial engineering analysis is completed</td>
<td>An initial engineering analysis is completed</td>
</tr>
<tr>
<td><strong>Eligibility of project:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source of funds:</td>
<td>Private company</td>
<td>Private equity investor</td>
</tr>
<tr>
<td><strong>1. Repayment mechanism</strong></td>
<td>Only through guaranteed energy cost savings</td>
<td>Two options: project’s energy cost savings or life-cycle cost effective analysis (LCC)</td>
</tr>
<tr>
<td><strong>2. Pay down or buy-out option</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Procurement process:</strong></td>
<td>RFQ by customer</td>
<td>RFQ by PG&amp;E</td>
</tr>
</tbody>
</table>

Table 6 – Comparison of Energy Service Contracts Programs

Local, state and federal government agencies have other resources that complement the financing component of a whole product program. The U.S. Department of Energy has a Zero Net Energy Commercial Building Initiative that provides some funding in the “Commercial Building Partners” alliance. This is an alliance with national laboratories and commercial building owners to conduct cost-shared research, development, and deployment (RD&D) and construct or retrofit buildings that achieve significant, unprecedented energy savings.

In 2009, American Reinvestment and Recovery Act (ARRA) (ref. 7) funding was available for energy efficiency loans. These funds have been administered by the California Energy Commission as low interest (1% and 3%) loans for efficiency retrofits. Because of high demand for this attractive financing, funds were quickly exhausted and the program closed in January 2010.

Financing available from cities and municipalities provides the capital for improvements so there is no upfront cash outlay by the owner, and the energy savings covers principal and interest. In addition, the owner gets tax deductions for the energy investments through depreciation allowances as well as tax credits for the efficiency investments. The net effect is that the owner boosts his operating income and return on assets.

**Role of the Utility**
Providing a compelling value proposition is only one step in PG&E’s leadership role. The next step requires that PG&E provide the necessary energy efficiency and LEED consulting to deliver an economically viable project.

“*Finance is necessary but not sufficient to get good projects done. There is a need to marry finance through the project development process – get them to decision ready……a utility based program can play a valuable role here.*”
Energy Efficiency Project Manager, Bellingham, Washington
In research sponsored by PG&E’s Local Government Partnerships program in August 2009, local government customers expressed strong interest in utilities being a single point of contact and in being a leader in creating integrated, long term energy savings plans. These customers agree that collaborations with PG&E to deliver community-scale energy solutions would be a great asset in supporting green house gas initiatives. PG&E teams could provide integrated customer solutions including energy efficiency, demand response, and distributed generation. Local governments have identified institutional barriers, however, which would have to be overcome to have an integrated solution.

“We’ve been missing an opportunity to bring Energy Efficiency and Demand Response together for the last 3 years. We can’t bring them together because PG&E administrates them through two different administrative structures.”
City of San Francisco

Interviews

Over 100 face-to-face and telephone interviews were held with industry experts, potential customers, and representatives from companies that have a product delivery role. The goals of this primary research were to:

1) identify barriers to energy efficiency investments discussed in the first phase of this research.
2) present the whole product concept as an option for overcoming these barriers
3) solicit feedback regarding the viability of the whole product
4) gain input on refining the whole-product
5) identify potential participants in the whole product pilot program.

<table>
<thead>
<tr>
<th>Organization Type</th>
<th>Organizations Interviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Owners, Managers and Tenants</td>
<td>Boston Properties, Kennedy &amp; Associates, USAA Real Estate, Cushman &amp; Wakefield, CB Richard Ellis, Jones-Lange-LaSalle, Tishman-Speyer, Intercontinental Hotel, California Center, 100 Pine, Embarcadero Center, Stanford, SLAC, xMC</td>
</tr>
<tr>
<td>Municipalities</td>
<td>City of San Francisco, City of Alameda, Sonoma County, City of Bellingham</td>
</tr>
<tr>
<td>Building Industry Organizations</td>
<td>USGBC/LEED, New Building Institute, RealPAC/Canada, BOMA, Silicon Valley Network</td>
</tr>
<tr>
<td>Financial Consultants</td>
<td>Clinton Climate Initiative, Real Win Win, Lawrence Berkeley Labs</td>
</tr>
<tr>
<td>Sustainability Organizations</td>
<td>CERES (national network of investors, environmental organizations and other public interest groups working with companies and investors to address sustainability challenges such as global climate change)</td>
</tr>
<tr>
<td>LEED Consultants</td>
<td>Swinnerton, Able Engineering, CCJM, FSC, Inc. (multi-disciplinary engineering company)</td>
</tr>
</tbody>
</table>
Table 7 – Organizations Contracted for Primary Research

All questions were pre-determined. Specific questions for each interview were tailored for the roles of the organization, but covered the general discussion categories of technology, property value and sustainability, finance, and customer needs as well. The primary questions were:

- What are your goals and strategies pertaining to energy efficiency, LEED, or sustainability?
- What progress have you made towards these goals?
- Who are the key decision makers for energy efficiency in your organization and how are decisions made?
- What are the key decision criteria for energy efficiency?
- How does capital availability and financing options influence the decision?
- What would incentivize owners to do long payback projects?
- What is your view of whole product and whole building programs from utilities?
- What are roles of organizations such as utilities, LEED consultants, ESCOs, vendors, etc. in the decision making process?
- What technology issues are related to achievement of sustainability and energy efficiency objectives?

In addition to the interview, the researchers presented PowerPoint communication packages about the whole product concept. This communication package outlined the concept (Table 4), the delivery process (Figure 1), and the value proposition.

Primary Research Highlights

The key findings from the primary research indicate that PG&E is considered a non-biased consultant and would be the preferred provider of the whole product. In addition, the findings showed that PG&E should:

- Help customers be more informed about the costs, benefits, and financing options for energy efficiency.
- Serve as a single point of contact to determine when to implement Sustainable Solutions projects and to make technical, analytical, financial, and project management issues easier to evaluate.
- Provide broad financing options.
- Assist in providing the energy savings performance of whole-building investments.

These findings are reflected in the comments below.
Help Customers be more Informed

Interviews with local building owners and managers in San Francisco reinforced the interest in sustainability and programs to help finance energy efficiency. There is uncertainty however, regarding new financing options such as tax lien financing and performance contracting.

For example, one property manager said he has not heard of the City of San Francisco’s tax lien funding for energy efficiency retrofits and he is surprised because he is active in BOMA SF. The interviewer explained the San Francisco program, and the property manager's response was:

“If this is cash flow neutral and the building operates at lower expense going forward, I like it, but show me the money. You hear these great programs but talk is cheap. Right now, San Francisco has a $500M deficit, has poor infrastructure, liberal government and they look at BOMA and commercial office properties as a cash flow to fund their big government.”

Another building owner who is undertaking a sustainability project had just attended a San Francisco Sustainability Conference where he heard about the Empire State Building project, which is a model for the whole product concept as it includes performance guarantees, financing, energy efficiency, and a sustainability element. His most noteworthy comment about a whole-building program that would be cash flow positive and increase his building’s energy efficiency by 30% was, “Show me the guarantee.”

These interviews show the interest in energy savings retrofits, but also indicate a need for information to increase the credibility of the financing component of a whole-product. There is a need to educate customers about how the whole product actually delivers the energy savings and increases the value of the property. Customer education needs to recognize that the owner’s decision is a financial decision that affects profitability and the value of his property, and that sustainability and energy efficiency are complimentary components of the whole-building investment. The connection between financial viability and the benefits of energy efficiency must be provable. Customer education has to show how sustainability and energy efficiency project financing increase property value.

Serve as a Single Point of Contact

A leading investment firm in energy efficiency has been working with building owners to help them develop sustainability strategies. A principal at this firm has had conversations with building owners that underscore the need for a single point of contact.

“They are being asked more and more to develop a programmatic approach (esp. property owners) – no matter how great the technology is, they are still a single ECM (single widget) and property owners are staggered by the amount
and complexity of various technologies and services and coming up with a comprehensive strategy and sequence it properly. She hasn’t seen anyone doing this well.”

Owners are looking for a turn-key sustainable investment solutions program in which there is a designated single point of contact. The investment firm representative cited above often advises owners to avoid auditing all of their buildings (because of the expense) unless the findings and financing are already pre-determined. Therefore, the first step is to determine financial, corporate, and institutional pieces – e.g. the length of the lease, when they are due, credit quality of tenant, vacancy for green and non-green, etc. This information can then be used for a more comprehensive audit that ultimately shows the savings that would be realized through sustainability upgrades.

“We are working with the top green firm in the country. We are coming in with a master plan designer, but also with a financial plan. So we are acting as a developer; we are developing projects in someone else’s property – pulling best in class technologies.”

Provide Broad Financing Options
According to an interviewee who quoted a DOE Study (Ref 9), more than half of all energy efficiency upgrades are declined because of financing issues. Evidence from interviews and previous research indicate that most owners are positive about energy efficiency projects that have paybacks of one year or less. Projects with longer payback periods end up competing with other potential investments and are often left undone.

The following comment from a property manager summarizes the present attitude toward financing of energy efficiency projects:

“Generalized statement is that a 1 to 2 year payback looks attractive. Otherwise, it depends on the REIT [owner]. We are conservative and they tend to look at things differently. I can’t say if (a program that provides loans based on the energy savings) will incent our company to do longer term paybacks. We will have to run the numbers to see if they are real or not.”
San Francisco Property Manager

It is unlikely that a whole-building project will meet a one year payback criteria. The returns on investments for comprehensive projects are more likely to be acceptable if sophisticated financial analysis is conducted by the owners. This analysis should account for risk mitigation with innovative financing, cash flows from energy savings, and the value of sustainability. Thus, understanding financing, providing believable savings numbers, and identifying and deploying financing options is critical to energy efficiency retrofit penetration and the whole product concept.
Assist in Proving the Energy Savings Performance of Whole-Building Investments
Research by the New Building Institute (NBI\(^9\)) showed the need for better evaluation and measurement tools to support energy efficiency investments. Interviews with NBI illuminated the requirement for similar tools for the whole product concept and identified a role for utilities in providing leadership in this area.

NBI completed a study in 2006 comparing evaluations of energy efficiency projects in buildings. Of 550 completed LEED, Energy Star and CBEC projects, 121 LEED buildings provided energy performance data. Analysis of the data showed lower than expected energy savings performance. A follow up study of 25 buildings investigated the reasons for below-expected energy efficiency performance.

“The worked showed how there are design, operations, and tenant feedback issues. The gaps in knowledge and information between these are significant. The people operating the equipment in 90 percent of the buildings (those under 25,000 sq ft) have no idea what is going on in the building – hours of operation, use…. They also never look at whether it is operating the way it was designed.”

Credible performance information is critical for making investment decisions. NBI studies indicate that there are inaccuracies even when using established measurement protocols if they are not properly applied. PG&E’s tools and expertise can assist in increasing the value of this measurement and evaluation information.

Energy efficiency programs that have a performance guarantee or stipulated savings must define a methodology for establishing baseline costs, measuring energy usage, and validating cost savings. Similar, but possibly not as rigorous, evaluation, measurement and verification (EM&V) is required by California legislation in AB113 and is a component of achieving and maintaining LEED certifications and Energy Star building ratings. Utilities currently have a role in providing billing data for these analyses and have a potential future role in delivering turn-key EM&V services.

Whole Product Delivery
The Whole product encompasses the entire project life cycle from marketing and sales through implementation and performance evaluation. This delivery process includes the major steps necessary to create value for the building owner and energy savings for PG&E. Figure 3 is a sketch of the expected delivery process for the whole product.

\(^9\) NAIOP, op. cit. p16
Figure 3 - Whole Product Delivery Process

PG&E can play a leadership role in identifying opportunities and guiding the building owner through analysis and project evaluation steps prior to the decision to execute the project. Key messages for the decision maker are:

- A whole product solution is recommended (rather than have building owners search out and manage a wide range of competencies and suppliers).
- Products and services are available to increase building value through energy efficiency and sustainability.
- PG&E pays incentives based on building energy efficiency achievements (rather than individual measure energy savings).

PG&E may elect to provide a variety of roles in this process. Specific organizational responsibilities in marketing, sales, engineering, and project management will need to be developed for a whole product program. Potential roles include:

- PG&E Corporate Accounts introduces whole product concept to a building’s senior management with the goal of reaching a basic agreement.
- Team of PG&E energy auditors and Emerging Technologies staff work with owners representatives and engineers to assess the building.
- PG&E team collaborates with owner’s team to:
Design a whole building solution with the potential to reduce energy use by 30% and achieve LEED certification.

Assist with:
- Bid preparation
- Arranging financing, including determining building value and cash flow scenarios
- Selecting Project management and implementation capabilities.

**Research Conclusions**

The interviews and industry analysis have enhanced the definition of the whole product concept and clarified PG&E's role. The whole product integrates sustainability, finance, and energy service value propositions. Key roles for PG&E are to educate the customer on the sustainability benefits of energy efficiency and the financing options as well as to link customers with service providers. Conclusions of the research are highlighted below.

**Sustainability**

Sustainability is a highly visible concept in the corporate boardroom as well as with building tenants. It is possible to translate sustainable operations of a commercial building into an increase in property value. The perceived leadership of sustainable buildings can provide a competitive advantage when competing for tenants. The common metrics for sustainability are LEED certification and Energy Star rating. Tenants look for these labels in their search for office space.

In LEED and Energy Star, energy savings is the major element in the certification, making it a component of the increase in property value from sustainability. At this time, it is unusual for building owners to maximize energy efficiency as part of LEED certification. The value of LEED certification is evolving and in debate.

Energy equipment vendors, particularly building controls suppliers, are using sustainability as a value proposition in selling to customers, but with limited success. These companies see PG&E as a leader in this area and would value PG&E as a channel partner to bring them the customer.

**Finance**

In today’s economy, capital improvement money is limited. However, the companies that are investing are taking a longer term and low risk approach, which make spending on energy efficiency and sustainability attractive.

Government programs have established new ways to finance energy efficiency projects. Federal stimulus funding has made low cost financing available for energy retrofits, and the program’s popularity demonstrates broad interest in energy efficiency investing at the right price. Municipal financing mechanisms
may also encourage these investments. PACE, or tax lien financing, is one approach, but it is new and not yet known to customers. PACE and other financing that pays for capital improvements out of energy savings opens new discussions regarding energy efficiency. PACE will be available in many areas in California in 2010.

Energy efficiency funds come from public and private sources. Private finance organizations are indifferent to energy efficiency performance of a proposed project so long as the risk is managed and the loan repayment is guaranteed. Like energy equipment vendors, finance organizations need an entity such as PG&E to bring them the customers.

Any financing proposition needs to include the value of PG&E’s incentives. One approach is that up to one-third of the incentives be used up front to help offset the initial engineering costs prior to acceptance of program financing. The program financing should finance all the engineering work, retrofit, and commissioning expenses. The balance of the incentives could be paid out over a period of five to seven years, in conjunction with annual performance measurements. These incentives would encourage ongoing operational excellence required to maintain and improve the performance of the energy efficiency systems and to meet PG&E’s goals of 30% energy savings and transition to zero net energy buildings. PG&E's whole product pilots can be used to determine the best blend of up-front and performance incentive payments.

**Whole Product**

Building owner and managers perceive the value of the whole product concept as a way to meet the objectives of their sustainability and energy efficiency programs. These customers want a single supplier, rather than having to seek out, integrate, and manage multiple suppliers. PG&E has the reputation as a credible supplier in energy efficiency consulting, and customers express preference for PG&E as the supplier of the whole product.

Technology is an important element of the whole-product. The research has shown that information on technology availability and performance, data and measurement requirements, and benchmarking are needed for assessing and implementing this type of project. PG&E is recognized as having the deepest organizational knowledge about achieving optimal building energy efficiency through application of multiple technologies, including emerging technologies. Customers rely on PG&E to qualify their technology decisions before implementing energy efficiency projects, underscoring PG&E’s leadership role.

Two primary themes emerged from discussions with building owners and the research during this phase of the project:

1. Owners understand the whole product concept and are enthusiastic about PG&E taking a leadership role in bringing them this product.
2. A key to the success of the whole product is PG&E’s ability to act as a single point of contact, and to prove and deliver the savings.

The whole product concept has evolved to become PG&E’s Sustainable Solution. PG&E’s leadership, project financing consulting, and provision of cost effective solutions together provide whole product solutions that are compelling to large commercial building owners. While each component has value on its own, only together do they become a compelling value proposition to owners to undertake larger, whole-building projects.

The research showed that PG&E can provide value in three areas: 1) leadership, 2) financing, and 3) Cost Effective Solutions. Together, these become PG&E’s value drivers for the Sustainable Solution program. These value drivers are outlined in Figure 4.

**PG&E’ Whole Product for Sustainable Buildings**

**Three Integrated Drivers**

- **Leadership**—Single point of contact and PG&E authority to promise and deliver whole product for sustainability
  - Valuation of Sustainability for building owners / investors
  - Energy Efficiency consulting / project design / continuous improvement
  - Energy savings verification / proof of savings

- **Financing**—Funding to pay for sustainability investments from energy / environmental savings
  - PACE / Utility on-bill / ESCO / off-balance sheet options that meet owner needs

- **Cost Effective Solutions**
  - Project management
  - LEED Consulting
  - Integrated demand side management solutions
  - Emerging Technologies
  - Incentives
  - Carbon Credits
  - Green Energy Credits

**Figure 4 – Value Drivers for “Whole Product for Sustainable Buildings”**

This research defined new elements which need to be developed. The table below shows the gap between existing PG&E measures for commercial office buildings and what is necessary to create a whole product.
<table>
<thead>
<tr>
<th>Sustainable Solution elements</th>
<th>PG&amp;E Offers</th>
<th>Additional Product Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Valuation of Energy Efficiency in Buildings</td>
<td>• Energy Star as the metric.</td>
<td>• Sell EE at building owner level (not operations level)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Test and use CCI or other best valuation tools</td>
</tr>
<tr>
<td>• Energy Efficiency Consulting</td>
<td>• Efficiency audits</td>
<td>• Long-term efficiency implementation plan</td>
</tr>
<tr>
<td></td>
<td>• Emerging Technology consulting and demonstration sites</td>
<td>• Long-term technology consulting</td>
</tr>
<tr>
<td></td>
<td>• CEE large customer programs (MTM)</td>
<td>• Integrated self-generation, EE, and conservation strategy</td>
</tr>
<tr>
<td>• LEED Certification</td>
<td>• Innovation points for demonstrating emerging technologies</td>
<td>• Consulting to achieve and value various levels of LEED</td>
</tr>
<tr>
<td>• EE Project Financing</td>
<td>• Local district on-tax bill financing</td>
<td>• Utility on-bill financing</td>
</tr>
<tr>
<td>• Project Implementation</td>
<td>• Third-party financing</td>
<td></td>
</tr>
<tr>
<td>• Project Implementation</td>
<td>• Provider references</td>
<td>• ESCOs as service providers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Contracting and project management assistance to vendors</td>
</tr>
<tr>
<td>• Efficiency Performance Verification</td>
<td>• Emerging technologies demonstration</td>
<td>• Tools to help manage implementation</td>
</tr>
<tr>
<td></td>
<td>• NRR verification process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• RCx program/incentive</td>
<td></td>
</tr>
<tr>
<td>• Incentives</td>
<td>• Program support for capturing utility rebates and incentives</td>
<td>• Incentives based on building energy efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Program support for different levels of audits (including investment grade), and LEED certification</td>
</tr>
<tr>
<td>• Carbon Credits</td>
<td>• Data center energy efficiency measures</td>
<td>• Valuation of and planning energy efficiency to reduce carbon</td>
</tr>
<tr>
<td>• Green Energy Credits</td>
<td></td>
<td>• Program for commercial customers</td>
</tr>
</tbody>
</table>

**Table 8 – Additional Product Opportunities for the Sustainable Solution**

The following table shows progress to date in filling some of the needs for The Sustainable Solution.
<table>
<thead>
<tr>
<th>Sustainable Solution elements</th>
<th>Results of This and other Recent Work</th>
</tr>
</thead>
</table>
| • Valuation of Energy Efficiency in Buildings | • Developed valuation presentations and messaging for owners  
• Developed valuation model based on economic benefits from capturing the value of LEED, energy savings, financing options and incentives. |
| • Energy Efficiency Consulting | • Pilot approach for project leadership with roles for Emerging Technologies and Sales and Service |
| • LEED Certification | • Calculation of LEED points from energy efficiency initiatives |
| • EE Project Financing | • Application of San Francisco’s PACE financing model to the Whole-Building concept  
• Introduction of third-party financing options into PACE model  
• Evaluation of federal sources of funding for whole-product including DOE project funds, stimulus (ARRA) funds, and tax credits |
| • Project Implementation | • Pilot approach for project leadership with roles for Emerging Technologies and Sales and Service |
| • Incentives | • Development of incentive program for the Whole-Product solution, which pays for performance over time. |

Table 9 – Project Contributions to the Sustainable Solution

**Recommendations**

This research has shown that the concept of PG&E’s Sustainable Solution for Commercial Buildings is a viable and potentially powerful program. The next step is for PG&E to continue to prove the concept and develop capabilities to deliver the concept to customers.

**Sustainable Solution Pilot**

The objective of a pilot is to prove the whole product sustainable solution. This solution includes:

- Building a ~5-year energy efficient building valuation strategy  
- Developing a ~5-year energy efficiency implementation plan  
- Using valuation and planning to encourage higher LEED certification levels  
- Connecting building owners with financing options, including the viability of PACE funding  
- Developing relationships with leading LEED APs as program design partners  
- Developing partnerships with project management, ESCOs, vendors, and other implementers  
- Assisting in verification of commissioning and energy performance  
- Providing incentives based on building performance over ~5 years  
- Testing business model options.
The pilots will be based on PG&E taking the leadership position and acting as the single point of contact and product champion. Ideally, PG&E should execute pilots with multiple building owners in different segments of the commercial and government owned space. These pilots will identify differences in the customer requirements that will be meaningful to a full scale program design. To create and execute these pilots, it is recommended that PG&E explore three business models:

- **PG&E Pilot Expansion**
  - This model expands from the pilot activity and engages the organization to transform the pilots into an ongoing program.
  - In this model, PG&E is the Program Leader, creating the market and proving the concept. PG&E owns the sales and design process. PG&E brings together the expertise and then helps the customer contract out the work.
  - For this model to expand, PG&E will have to deploy program managers and technical support teams who own program leadership through project design.

- **Expert Adopter**
  - In this model, PG&E hands over project leadership to expert property managers who have “energy groups,” and these groups will be the Program Leaders. PG&E sells the concept and promises resources, but hands leadership to the customer. This would be most effective with the largest, most sophisticated buildings.
  - PG&E must determine how the property managers can work with PG&E so that PG&E can provide a compelling EM&V case to the CPUC about its impact on the market.

- **Channel Implementer**
  - In this model, a third party (other than the property manager) is the Program Leader and they market and deliver the program to their customers. PG&E provides them with the tools and program elements to bring the Sustainable Solution to customers, but PG&E does not control the sales process. These third parties are agents, selling the PG&E program in the market.
  - This role could be performed by project managers, energy consultants, general contractors, or ESCOs.
  - Implementing this business model requires more program structure than the other two approaches. The rules of engagement between PG&E and its marketing partners must be clear, and managing quality of execution must be supported by all parties.

- **The pilot implementation will test the utility program steps (Figure 5) for the delivery of the Sustainable Solution, and will help define the product features and implementation roles of the Sustainable Solution.**
Figure 5 – Utility Program Delivery of the Whole-Product Sustainable Solution
References


4. Green Building Retrofit and Renovation; Rapidly Expanding Market Opportunities Through Existing Buildings; 2009; McGraw Hill Construction

5. Energy & Resources Group UC Berkeley; Prepared by Merrian Fuller for CIEE Financing; ENABLING INVESTMENTS IN ENERGY EFFICIENCY - A study of energy efficiency programs that reduce first-cost barriers in the residential sector


9. Tier 1 Final Report, Compiled by Utah Energy Office and Idaho Department of Water Resources; Funded by U.S. Dept. of Energy Grant #DEFG01-86CE64616, August 1988