STATE OF CALIFORNIA Edmund G. Brown Jr., Governor

PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
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July 13, 2011

Release of CPUC Consultant Report on Energy Efficiency Financing in California

Dear Stakeholders:

I am pleased to announce the release of the consultant report "*Energy Efficiency Financing in California—Needs and Gaps – Preliminary Assessment and Recommendations*". This comes at a time of heightened interest in both efficiency and customer-based solar generation financing in California, other states, and at the U.S. Department of Energy.

In 2008 the CPUC adopted the California Energy Efficiency Strategic Plan, which recognized the critical role of financing in helping California to meet its energy efficiency goals – especially for obtaining efficiency improvements to existing homes, businesses, and other facilities. In Decision D.09-09-047 (2009) the Commission specifically directed Energy Division staff, in consultation with knowledgeable financial experts, to prepare an assessment and plan for ensuring the most promising and effective financing instruments are available for energy efficiency investments.

Later in 2009 the State Legislature enacted AB 758 (Statutes of 2009) that directed 1) the California Energy Commission (CEC) to develop a comprehensive program to achieve greater energy savings in the state's existing residential and nonresidential building stock, and 2) the CPUC to investigate the ability of electric and gas utilities to provide energy efficiency financing options to their customers to implement the program to be developed by the CEC.

The Energy Division engaged a consulting team, Harcourt Brown & Carey (HB&C), to accomplish both the Commission's and Legislature's directions to identify meaningful financing approaches for efficiency. HB&C conducted a needs and gaps assessment, and has made findings and recommendations for the most effective approaches to facilitate capital investment in efficiency. Energy Division staff and HB&C together conducted public workshops in October 2010 to explore issues, needs, and promising ideas. Since then the consultant team has documented specific mechanisms, and compared them to both the scale of investment needed in California and the specific needs of borrower market segments. The attached report presents their findings. The report can be downloaded at: http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/Programs/

The report provides this assessment and makes a series of recommendations for potential initiatives to pursue. We expect the report will provide useful common ground for all stakeholders interested in the subject of energy efficiency financing, and help inform the dialogue already underway in California (and nationally) to better focus on those approaches

that offer the greatest promise. In particular, we expect to uses this report as a starting point for our work with the CEC regarding AB 758 programmatic direction.

Some of the recommendations in the report go beyond "financing" to suggest new or modified business models, greater efficiency program standardization, and other changes needed in the marketplace to make the efficiency value proposition more transparent to financial decision-makers.

It also is important to note that this report does not evaluate the potential public cost of supporting various financing mechanisms (including loan guarantees, interest subsidies, underwriting and administrative costs, etc.) via either taxpayer or ratepayer support. Nor does it compare the relative merits of allocating public/ratepayer funding support among efficiency information and assistance programs, traditional utility rebates and incentives that reduce out-of-pocket investment costs in efficiency, and financing mechanisms.

These kinds of discussions remain ahead among stakeholders and decision-makers in California. There will be opportunities for comment and dialogue on this report, either as part of CPUC procedures, or possibly in some other forum. Further information will be forthcoming on the opportunity for comment and dialogue. For now, I serve as the primary staff contact at the CPUC on this report.

Sincerely,

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Energy Efficiency Financing in California
Needs and Gaps

Preliminary Assessment and Recommendations

Presented to
The California Public Utilities Commission, Energy Division

July 8, 2011

Harcourt Brown & Carey, Inc.

Harcourt Brown & Carey (HB&C)

HB&C is a national firm with an exclusive focus on clean energy financing on the customer side of the meter. The firm's principals have decades of experience in energy efficiency and renewable energy finance and have worked with all the major financing product types and market sectors. HB&C's clients include the federal government, national laboratories, utilities, lending institutions, states, local governments and non-profits. HB&C conducts finance product design, capital formation and research. For further information please visit www.harcourtbrown.com.

Executive Summary

The Opportunity
There is general agreement within the community of energy efficiency advocates that, on a national level, approximately 25 percent of a building's energy consumption could be avoided by investing in energy efficiency measures and that the resulting savings would represent a four to five year payback.[1] These numbers are based on averages; energy savings paybacks can be much quicker in some cases and considerably slower in others.

California's Energy Efficiency Goal
California has had a long-standing, 30-plus year commitment to energy efficiency as witnessed by California's low level of per capita energy use, as the national average keeps rising. However, California estimates that there remains multi-billion dollar energy efficiency investment opportunity. To capture the benefits that efficiency offers (in terms of least-cost energy resources, reduced GHG emissions, local economic development and job creation), California has adopted numerous public policies, goals and programs to achieve higher levels of efficiency throughout the state. California is among the most aggressive states in pursuing energy efficiency and the state's efficiency goals are detailed in this report.

California's Progress toward the Goal
Harcourt Brown and Carey (HB&C) was hired to determine the role that energy efficiency financing should play in achieving these goals and to suggest specific prioritized financing initiatives that the state should explore.

HB&C's Analysis
HB&C calculated that achieving levels of efficiency consistent with California's goals will require a capital investment of approximately $4 billion per year.[2] However, current levels of energy efficiency investment in California appear to be approximately one-half that amount. Consequently, the rate of adoption of energy efficiency technologies and the capital to finance that up-take, must increase for California to achieve its goals. Along with other market solution mechanisms, appropriate cost-effective financing for energy efficiency can play a significant role in achieving these investment goals.

HB&C's Conclusion
Most energy users are aware that they could save money by adopting energy efficient technologies and many users are also aware that doing so would create jobs, reduce both pollution and dependence on foreign energy sources. One can ask, why do energy users prefer to prefer to pay a premium to purchase energy units, rather than lower-cost energy efficiency? **The answer is: energy is sold as a service, and its procurement is both simple and convenient whereas energy efficiency requires a complex procurement process, a capital investment and the risk associated with the installation and the resulting energy savings.** HB&C believes that this explains the existence of the 25 percent savings opportunity. Consequently, in order to accelerate the up-take of energy efficiency, California needs to continue to transition the market for energy efficiency to a convenient, one-stop service for reducing energy use and cost. Financing is one of several key elements to comprise this one-stop solution.

HB&C's Recommendations by Market Sector
To evaluate financing for energy efficiency, HB&C segmented the market into three sectors: Single Family Residential (1-4 unit properties, owned by generally non-economic decision makers), Government and Institutional (properties occupied by not-for-profit organizations) and Commercial (5+ unit, for-profit multifamily, small and large commercial and industrial properties).

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[1] McKinsey & Company, *Unlocking Energy Efficiency in the U.S. Economy*, 2009; http://www.mckinsey.com/clientservice/electricpowernaturalgas/us_energy_efficiency/
[2] Appendix C

The ***Single Family Residential Sector*** is not restricted by lack of financial products, numerous, unsecured, first and second lien products are available; it is restricted by (1) high interest rates associated with that financing and (2) the fact that many of the financing products now available are cumbersome and difficult to access. In addition, California's residential financing sector is hampered by a lack of project volume, particularly for comprehensive whole house energy efficiency projects. California should work with federal and other state initiatives to reduce the interest rates on the three key finance products: unsecured, first lien energy efficient mortgages (EEMs) and second lien products, particularly the new FHA-insured, PowerSaver product. The cost-effectiveness and marketability of these products can be increased through loan loss reserves, interest rate buy-downs, revolving loan funds, on-bill collection and greater loan volume which will attract the interest of the capital markets and drive innovation.

The ***Government and Institutional Sector*** has access to funds through tax-exempt municipal financing and municipal bonds and is generally not restricted by lack of financing. What is lacking is the knowledge and experienced personnel to identify, procure and implement energy efficiency projects. This market is served by an effective business model: energy services/performance contracting. It appears that this procurement method is under-utilized and has not captured widespread adoption due to lack of understanding of its benefits and a standardized process for its procurement. California should evaluate the approach of other states (e.g., Pennsylvania, Massachusetts and Kansas) that have aggressively pursued the energy services model by offering education and procurement support for public sector facility managers. Considering the manpower and capital restraints imposed on governments and institutional organizations, this sector should use this one-stop, turnkey business model to "buy" energy efficiency expertise and capital improvements with their existing energy budget.

The ***Commercial Sector*** is not necessarily constrained by lack of financing but rather by the lack of a compelling value proposition. This sector is generally offered energy efficiency, funded by various forms of debt, under either a conventional contracting model or the energy services/performance contracting (ESCo) model. However, energy costs typically represent only 2-4 percent of an operating budget and commercial enterprises generally prefer to reserve the use of debt (access to which is limited by the strength of the balance sheet) to initiatives that support the core business (e.g., manufacturing widgets, providing a service, etc.). Consequently, energy efficiency projects rarely win the competition for an enterprise's limited capital. California has addressed energy efficiency financing in the commercial sector through rebates, on-bill debt financing and other incentives offered generally by utilities. However, HB&C believes that the commercial sector would adopt energy efficiency in greater volume, if it were offered as an off-balance sheet service (as "energy services" was originally intended during its inception in the 1980s). If that were the case, ESCos would first need equity financing to strengthen their balance sheets, with that accomplished, the capital markets would be willing to fund the debt portion of ESCo's projects and ESCos could sell energy efficiency as it was initially intended, as a service. To get there, the ESCos must begin to embrace the needs of the Commercial Sector. Recent business model developments by the energy service providers such as, Transcend Equity Development and Metrus Energy, indicate that this may be happening. California should also work with lenders to enhance debt financing and with the leasing industry to explore innovative master lease arrangements under which utilities pass-through low cost, off-balance sheet lease financing to their commercial customers.

Chapter 1. Introduction

Background

This report, authorized by California Assembly Bill 758 (Statutes of 2009) and prepared at the request of the California Public Utilities Commission (CPUC) Energy Division staff, provides input for the Energy Division staff response to CPUC Decision 09-09-047 (Decision). The CPUC Decision addressed various energy efficiency issues in California and established a plan for California's investor-owned utilities to invest $3.1 billion during the 2010 to 2012 cycle. The CPUC received substantial input from interveners urging utilities to create financing programs to serve all customer classes, including residential, government-institutional, commercial and industrial. As a result, in its decision the CPUC stated:

> "Contractors, parties and others assert generally that financing is needed for large and small commercial customers, taxpayer funded institutions and residential customers. Utilities state that more research is needed to understand customer segments, financing needs and appropriate lending instruments […..] moreover, we find it important that attention to identifying, developing or offering appropriate energy improvement financing instruments and programs should address the needs of all energy users in the state and not just those of customers in the utility service areas. We seek to achieve statewide alignment and similarity in the instruments in California… It is clear that financing is a complex terrain that must be well-matched to the particular needs of customers as these are affected by size, tenure in facilities and whether business or institutional organizations. It is equally clear there are significant issues of cost and leverage that require attention when ratepayer funds might be called upon to support financing transactions."

Consequently, CPUC instructed its staff to direct an investigation that examines financing mechanisms for various ratepayer categories and customers across the state with the aim to identify needs and gaps in the marketplace.

In addition, according to Assembly Bill 758 "….the bill would require the PUC, by March 1, 2010, to open a new proceeding or amend an existing proceeding to investigate the ability of electrical corporations and gas corporations to provide energy efficiency financing options to their customers to implement the comprehensive program that would be developed by the Energy Commission pursuant to this act." The bill also would require the PUC to include an assessment of each electrical corporation's and each gas corporation's implementation of that program in a specified triennial report required under existing law.

As a result, the California Long-Term Energy Efficiency Strategic Plan (Strategic Plan), adopted in 2008, set forth a statewide roadmap to maximize the achievement of cost-effective energy efficiency in California's electricity and natural gas sectors between 2009 and 2020 and beyond.

This report provides background analysis and recommendations for the Energy Division staff to consider in the context of the California Strategic Plan, D.09-09-047 financing directives, and AB 758.

Report Objectives

This report offers recommendations to California to improve existing financial products or to propose new products to help California meet its goals for energy efficiency for buildings and industry. The California goals, as specified in the Strategic Plan, are to present information useful to CPUC, CEC and other public entities regarding:

1. The relative state of EE financing products available and their adequacy, and
2. Priority areas, relative to our EE goals to focus attention to improve existing mechanisms or establish new ones.

The California energy efficiency goals include the following milestones:

By 2015:

- Reduce energy consumption in existing homes by 20 percent by increasing demand for efficient homes and energy-consuming products.

- By 2015, reduce by 20 percent the amount of energy consumed by local governments in 2003.

By 2020:

- Ensure all new houses constructed in California will reach "zero net energy" (ZNE) performance.
- Reduce energy consumption of existing homes by 40 percent.
- Make energy efficiency certification and benchmarking standard practice for businesses, which represent 80 percent of the industrial sector's energy use.
- Reduce energy intensity (per gross dollar of production value) in the industrial sector by at least 25 percent.
- Reduce agricultural sector production intensity by 15 percent from 2008 levels for non-renewable energy.
- Reduce energy use by local governments an additional 20 percent by 2020.

By 2030:

- Ensure that all new commercial buildings in California achieve zero net energy.
- Ensure that 50 percent of existing commercial buildings achieve zero net energy.

Focus of the Report

The central question addressed in this report is what role should the state (statewide) or the state's utilities (investor-owned or public utilities) play in developing methods to finance large-scale energy efficiency HVAC, lighting, building shell and process upgrades for all market sectors? Should the state, the utilities, or both:

1. Provide the capital for loans or other financing products?
2. Assume the credit risk (losses due to borrowers defaulting on loan payments) for private transactions to attract private capital?
3. Assume the performance risk (shortfalls in energy and dollar saving) for energy efficiency installations and to attract private capital?
4. Monitor quality control, facilitate transactions, market products and otherwise identify ways to make the finance market for energy efficiency installations operate efficiently for all sectors?

The financing recommendations in this report respond to these four questions and address the corollary issue of—if not the state or its utilities—what entities are best positioned to assume these responsibilities?

Methodology

The following methodology was used to arrive at recommendations in this report.

1. Identify the California energy efficiency goals as specified in the Strategic Plan and adopted in D.08-09-040.
2. Estimate the investment required to achieve California's energy efficiency goals.
3. Determine the current rate of investment in energy efficiency and assess whether current levels of investment will lead California to achieve those goals and compare today's investments to those goals.
4. Summarize and analyze the current financing products available to each of the major energy consuming sectors in the state. This report:
    a. Identifies the existing products being used to finance energy efficiency for each market segment
    b. Evaluates the strengths and weaknesses of those products.
    c. Identifies shortcomings of those products, the financing "gaps", in each market sector.
5. Provide recommendations to meet California's need for adoption of energy efficiency by modify existing products or by proposing new products, based on cost-effectiveness and perceived value in the marketplace.

Cross-Sector Principles

A sector-by-sector examination of energy efficiency goals, financing products and financing product deficiencies reveals that a number of principles are common to all energy-consuming sectors as specified below.

1. Financing is necessary but not sufficient to meet ambitious energy efficiency goals. Energy efficiency programs, broadly, must address other key issues that include:
    a. Marketability,

b. Energy assessments to establish a cost-effective scope of work,
c. Contractor certification,
d. Installation quality control, and
e. Measurement and verification.

2. Efficiency programs that offer financing should be designed to incorporate both loan-level and aggregate data gathering and data sharing capabilities. This information will help investors understand the performance and risks associated with energy efficiency lending. Because few investors understand the performance of loans used to finance energy efficiency, the availability and interest rates of these products is negatively affected.

3. Financing structures that leverage public money or ratepayer funds can allow for deployment of greater capital than would be possible through direct use of utility or public funds (100 percent of the funds provided by the utility or public entity). For instance, a loan loss reserve of $1 million may encourage private investors to make available $10 million of funding (a 10-to-one leverage ratio).

4. To the extent possible, the financing should be made available to the energy user through a simple, point-of-sale process that does not require the potential borrower to interact with third parties directly (e.g., banks, mortgage bankers, finance companies, lease companies, etc.). Programs with rates as low as zero will produce very little volume if they require the borrower to work with multiple parties. Ideally, property owners should be able to acquire energy efficiency improvements without assuming debt, but rather, to acquire efficiency as a service, similar to the process and terms under which they acquire energy.

5. Wherever possible, the energy efficiency industry should establish standards for procurement, contracts, energy assessments, pricing, measurement/verification, and cost-effectiveness.

Limitations of this Report

The energy efficiency financing options presented in this report are offered with the expectation that the CPUC and the California IOUs, as well as other states, utilities and industry participants, will consider as the most promising options. The analysis assesses existing products and offers recommendations to modify these products or to develop new financing methods to meet California's energy efficiency goals. Although the report identifies these major finance product options and provides a perspective on the relative cost of each option, it is not designed to provide a highly detailed cost assessment of each. Such a detailed analysis would require more specific finance product design than is contemplated for this report. For instance, while we recommend the CPUC consider proposing that the IOUs participate in a master lease program, the costs of such a program depend upon the volume of leases written, the quality of the credits, the level of risk assumption by the state, and the distribution of overhead costs.

Further, this report is meant to offer information based on currently available costs and data. In some cases, such as discussion of finance products to meet zero net energy goals, a detailed cost assessment is unavailable due to lack of consistent, reliable data.

Numbers and calculations in this report, related to energy consumption/cost and installation cost/savings, by square foot, by property and by market sector are meant to provide a sense of scale and direction of the opportunity to improve the energy efficiency in California's buildings and are not intended to be a precise estimate. The data was acquired from numerous sources including: the U.S. Energy Information Administration, California Energy Commission and various independent sources (see other sources in appendices). Consequently, these numbers are preliminary and are subject to adjustment.

Report Organization

In this report, one chapter is devoted to each of the three market sectors: single family residential, government/institutional and commercial (multifamily, industrial and agricultural are combined in the commercial

sector, because all of these property owners are for-profit, economic decision makers with profit/loss and balance sheet limitations). Each chapter is divided into three sections:

1. *The Challenge*: This section includes a listing of the California goals, an estimate of the current rate of investment, the investment required to meet each goal.
2. *Analysis*: This section describes existing financing products, their costs, their strengths and weaknesses, and the "gaps" that exist between current finance offerings and possible enhancements or innovations to accelerate the uptake of energy efficiency at a rate consistent with California's goals.
3. *Recommendations*: Each chapter concludes with a rank ordering of current and/or proposed financial product enhancements and innovations and an estimate of the public cost to implement these initiatives. We did not attempt to prioritize across the three market sectors, because there are substantial differences in market size, existing market conditions (products and uptake) and opportunity cost effectiveness.

The final chapter ("Chapter 5. Conclusions") summarizes report findings.

Chapter 2. Single Family Residential Market (Statewide)

Section 1. The Challenge

The Goals

In 2008, the California Public Utilities Commission (CPUC) established an ambitious set of energy efficiency targets for the state's residential sector as set forth in the Strategic Plan and adopted in D.08-09-040. These are:

- A 20 percent reduction in energy consumption in existing homes by 2015, and
- A 40 percent reduction in energy consumption in existing homes, with new homes achieving zero net energy by 2020.

These goals, measured both in terms of their size and their timeline, are among the most ambitious in the United States. Although California has made steady progress toward improving its energy efficiency across all energy-consuming sectors and ranks 47th among all states in per-capita energy consumption,[3] these goals, at least in the residential sector, will require significant new investments in energy efficiency.

These investments in residential energy efficiency vary by the properties' size and age and type of equipment. For example, an energy efficient installation might involve only central systems (e.g., replacing a furnace with a more efficient model or installing high-efficiency air conditioning). Or these improvements could be paired with new insulation, lighting and envelope and duct sealing for a more comprehensive project. Improvements such as these could increase a home's energy efficiency by 20 percent, but achieving California's ambitious goals will require a very high percentage of homeowners to perform similarly comprehensive improvements to meeting the sector goals by 2015.[4] In other words, to achieve a 20 percent energy consumption reduction in the entire housing sector would require a 40 percent reduction in 50 percent of that sector. Among the requirements to reach these goals are:

1. Comprehensive retrofits of individual homes that result from energy efficiency audits and installation of multiple, integrated measures. In many cases, reaching the higher-level goals also will require on-site generation through solar power.
2. High market penetration that exceeds the levels reached to date.

Because consumers generally do not seek financing for its own sake, it must be seen as a way to enable Californians to close a sale, especially for those who have difficulty meeting the up-front cost of making their homes more energy efficient. Financing is a necessary part of energy efficiency programs but, in itself, is not sufficient to enable California to reach its ambitious energy efficiency goals.

This chapter is divided into three major sections:

1. An introduction that provides an overview of the investment required to meet California's goals and presents challenges/opportunities.
2. An analysis of the existing suite of financing products available in California and elsewhere.
3. A set of recommendations for action related to altering existing financing products or creating new financing products in California.

Overview of Investment Required to Meet Goals

This section focuses on the size of the investment required to meet California's energy efficiency goals and contrasts that investment with the current level of the utilities' and their customers' investment in energy efficiency. Although

[3] http://www.eia.gov/state/state_energy_profiles.cfm?sid=CA
[4] http://www.pge.com/nots/rates/tariffs/tm2/pdf/GAS_3087-G-A.pdf

the numbers are meant to provide an estimate based on order of magnitude—not to provide a precise estimate—the conclusion is that a significant investment beyond that currently in place will be required.

The CPUC has not produced an overall estimate of the magnitude of investment required to meet California's residential sector energy efficiency goals. The following discussion, however, provides a general sense of the investment needs. It relies on an overview of the size of the residential market, targeting based on age of properties, and general estimates of the size of energy efficiency investment needed for homes in this sector.

Market sizing and targeting: single family housing units

The total number of housing units in the single-family sector is approximately 8.4 million (defined here as 1 - 4 unit properties) that consume approximately $17 billion of energy per year. [5, 6,7]

Of all California's housing units, approximately two-thirds were constructed before California's strict Title 24 building energy codes were adopted in 1978; these older homes are likely to be the best candidates for energy efficiency upgrades[8]. Assuming that 72 percent of these homes are 1 - 4 unit single family dwellings (see footnotes 6 and 7) most likely candidates for substantial energy retrofits number approximately 5.8 million homes built before implementation of Title 24 building codes.

Typical upgrade costs

A typical energy efficiency upgrade, which can be expected to achieve reductions of 20 - 25 percent in a single family home, consists of upgrades to insulation, duct sealing, and air conditioning and heating systems.[9] The typical cost of such an upgrade varies according to the size of the house. Interviews with market participants that install such upgrades indicate that, for a typical upgrade in a house of approximately 2,500 square feet (this home size is 700 square feet larger than the average single family home in California) , a 20 percent energy use reduction would cost about $14,000 to $15,000.[10] These costs generally would be broken out as shown in Table 1.

Table 1. Break-out of Major Components of Whole-House Retrofit

Measure	Measure Cost	Total Cost
HVAC and Duct Sealing	$11,000	
Insulation	$1,250	
Air Sealing	$1,800	
		$14,050

Source: Gary White, WellHome, conversation with author, January 2011, based on California data.

Based on estimates in Appendix B, to achieve a 25 percent savings level in California's homes, at a cost of $7,200 per home, would require an estimated installed cost of approximately $60 billion[11]. If one assumes that 20% savings could be achieved for $50 billion, it would require an investment of approximately $8 billion per year (during a seven year period).

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[5] U.S. Census, American Fact Finder, http://www.factfinder.census.gov/servlet/ADPTable?_bm=y&-geo_id=04000US06&-qr_name=ACS_2009_5YR_G00_DP5YR4&-ds_name=ACS_2009_5YR_G00_&-_lang=en&-_sse=on

[6] Final filed Research Report, Prepared for the California Energy Commission under PIER Contract #500-40-030, ESCos Consulting, October 31, 2006.

[7] Appendix B

[8] The age of California's housing stock is shown in Appendix A Table 1

[9] http://www.pge.com/nots/rates/tariffs/tm2/pdf/GAS_3087-G-A (Advice Letter 3087-G-A/3608-E-A). 3/29/2011, Implementation of Prescriptive Whole House Retrofit Program in Compliance with D.09-09-047

[10] Based on HB&C interviews with whole house contractors, 2011

[11] Appendix B

This estimate provides an order of magnitude of required investment based on an assumption that most of the residential sector goals will be met through home retrofits. Natural turnover and replacement of home appliances also will contribute to this goal. The opportunity to save energy from plug loads (computers, home entertainment and other appliances) is not included in this calculation. However, plug loads represent more than 15 percent of the total energy consumption in a typical California home.[12] (Appendix Table 2 contains an estimate of plug loads in California.)

While the case by case contributions vary considerably, and programs are delivered through a variety of vehicles including rebates, building and appliance standards, and other means, if one assumes that utility financial incentives represent approximately 30 percent of the cost of an energy improvement, California utilities would need to contribute 30 percent of $8 billion by 2015 or $2.5 billion per year. This level of investment would achieve the goal in only the residential sector, yet it appears to represent approximately two times the annual investment for all sectors. The proposed spending for the California utilities for the residential sector is $309 million per year. Consequently, investments at this level for 10 years will not be sufficient to meet the goal.

This brings up the issue of cost-effectiveness. The energy efficiency spending by the California utilities is based on assumptions of cost-effectiveness for society. This hurdle limits the investment by the utility company, but homeowners may be willing to invest more aggressively if given a convenient process and a compelling rationale.

The scope of this report does not allow a precise analysis of the investment requirements required to meet California's energy efficiency goals. It is meant, however, to illustrate two points: 1) that the investment requirements to meet California's goals will be substantial, and 2) the current trajectory of spending is unlikely to meet those levels.

It is important to note that meeting these goals will likely require whole-house audits and retrofits as well as on-site generation in some cases. However, it is clear that the per-household investment levels shown above are, in most cases, a minimum. To achieve greater levels of energy efficiency, investments of more than $14,000 will be necessary. This data point will become critical in the following discussion of financing gaps and financing products. The market that we are trying to mobilize is for very comprehensive whole-house installations, probably based on the Home Performance with Energy Star (HPwES). HPwES is a home retrofit standard designed for contractors by the EPA to promote the proper installation of energy efficiency measures. These installations would seek to reduce consumption by 30 percent through energy efficiency and renewable (solar and geothermal) measures and would produce break-even cash flow with 6 percent interest rates and 12-year terms.

A critical part of the strategy to bring new capital to meet the goals is to attract private and non-utility capital to make the residential sector more energy efficient. Opportunities and challenges for financing in the residential market are discussed below.

Opportunities and Challenges for Financing in the Residential Market

This section describes the major opportunities and challenges in financing residential energy efficiency. This section concludes that creating programs that produce substantial participation rates (greater than 1 percent of the eligible population per year) can be achieved with only a very simple program process that ensures a high-quality installation and competitive pricing. The most attractive process is a "single-stop-shop" with point-of-sale financing (with "at the kitchen table" closing of the financing). In other words, the homeowner interfaces with one party, the contractor. It has been said that, for every additional party with which the homeowner must interact, participation rates are reduced by 50 percent.

[12] Final filed Research Report, Prepared for the California Energy Commission under PIER Contract #500-40-030, ESCos Consulting, October 31, 2006.

Opportunities

The decision maker is also the homeowner

One challenge inherent in many financing markets is to reach the person who is responsible for making a decision to install and pay for an energy efficiency upgrade. Financing in the owner-occupied, single family residential sector is less complicated because it usually is easy to identify the decision maker. See Appendix D for a marketing analysis of the of the single family residential market opportunity,

Credit risk is easy to evaluate using accepted methods of credit evaluation

Credit card companies, banks and finance companies are accustomed to evaluating consumer credit through methods such as FICO scores, debt-to-income evaluations and other standardized methods. Sufficient data on most potential borrowers are readily available to lenders and the advantages and disadvantages of these methods of evaluating credit are well understood. They can be easily applied to new or modified energy efficiency lending programs.

Home ownership structures are standardized

As a rule, it is not difficult to determine who owns and controls a home's ownership. In contrast to the commercial sector, which is dominated by limited liability corporations that own buildings or real estate investment trusts (REITs) that parse out the ownership in major buildings to many investors, the single family residential sector is characterized by simple ownership structures.

Energy savings potential is high

The opportunity to improve energy efficiency in the 8 million single family homes is substantial. The brief analysis above indicates the large number of single family residential structures built before 1980; old heating systems, pre-Title 24 levels of insulation, duct sealing, air sealing and other features point to a strong opportunity in the residential sector.

Challenges

Energy savings is only one among many priorities for homeowners, so any barrier to acquisition can result in a lost opportunity

Energy bills are only one among many priorities for homeowners or renters. As a result, it is a challenge not only to convince them to make an investment in their home, but also to maintain their commitment. As a result, complicated, time-consuming financing programs produce low participation rates. The "answer" is a simple program process.

Speed and simplicity are critically important, so detailed underwriting is not always possible

Detailed underwriting that would reassure many financial institutions and investors for whom energy efficiency investing may be a new and unfamiliar product often is impractical. Such lending needs to be interlaced carefully into the efficiency marketing and sale process and often may require a consumer finance lending model familiar to most consumers, lenders and vendors. Reliance on simplified, FICO-based underwriting is the "answer."

A large number of small projects increases transaction costs

The residential market for energy efficiency involves a high volume of relatively small projects. From an efficiency financing perspective, this requires origination, underwriting, loan servicing and collections of many small loans. These fixed expenditures can make small transactions too costly. Minimizing origination costs is the "answer."

Single family residences have longer payback periods

Unlike many commercial+ or industrial energy efficiency retrofits that can pay back within two to three years or less, investments in the residential sector may have longer payback periods that often exceed 10 years. Because of the extended payback periods on many energy efficiency retrofits and because many energy efficiency lending products come with lending terms of less than 10 years, it is difficult or impossible to offer borrowers positive cash flow (in which periodic energy savings exceed debt service payments) as soon as they install their retrofits. As a result, a homeowner will rarely purchase an energy efficiency retrofit based only on energy savings. Long loan terms and low interest rates are the "answer." A 12-year loan term and a 6 percent interest rate will produce positive cash flow for 10-year paybacks.

Delivery network of contractors is highly disaggregated

The network of contractors who provide services to the residential sector consists of many small electrical, HVAC, plumbing or other tradesmen. Few whole-house contractors exist in the sector. The quality of work produced by such contractors varies widely and is difficult to standardize. Further, although the number and size of performance contracting firms has continued to grow because state and federal programs began supporting the industry, these contractors typically have tight cash flows, cannot carry receivables and cannot easily scale up to higher levels of energy efficiency installations. Strong dealer loan programs that fund the contractor quickly (within one week) solve this problem.

Mortgage lending and consumer/dealer (contractor) financing are highly regulated in the United States and in California

Mortgage, consumer and dealer finance for residential customers are highly regulated in California—more so than in many other states—and require lenders in this sector to register, pay fees and comply with numerous state and federal laws such as the Truth in Lending Act (TILA). Lending in this sector requires knowledge of and expertise in these regulations and laws. IOUs rarely participate in the residential finance market, and the California IOUs have avoided this role as well. If IOUs maintain the position that lending is not their forte, this function must be performed by traditional financing firms

Section 2. Analysis of Existing Financing Products

This section analyzes financing products in the following sequence: 1) Description of *existing financing* products and discussion of their strengths and deficiencies; 2) Analysis of overall *gaps* in the ability of these financing products to meet California's goals; and 3) Characterization of the *optimal* financial product or products for various transactions.

In the residential sector, a host of products exists for consumers to use when they buy or retrofit their home or when they replace equipment. Consumer needs vary based on project cost, the urgency of the project, borrowers' creditworthiness and other factors. As a result, no single financial product will be available to transform the energy efficiency market in which all manner of energy efficiency transactions can be easily financed. A variety of financial products will be necessary to meet each of these needs; yet, these products have not been fully developed or widely adopted.

Two major categories of financing products are defined and described in detail below, including the advantages and disadvantages of each: 1) Unsecured financing and 2) Secured financing.

Description and Analysis of Products Types

This section examines the existing suite of financial products and assesses their effectiveness in reaching various market segments. HB&C concluded that the critical features of a residential unsecured financing product are a point-of-sale origination process (the contractor should control the financing process) and a low interest rate (borrowers fixate on interest rates). Approval rates are important, but losses increase dramatically with higher approval rates and the losses generally are passed on to all borrowers in the form of higher interest rates, which drives away more creditworthy borrowers who have other options, making high approval rates a self-defeating goal. The critical elements of first lien secured financing are acknowledging the value of the cost reducing improvements through increased appraised value or increased disposable income that will allow the borrower to service the additional debt. The product designed for this application is the Energy Efficient Mortgage (EEM), available in various forms since 1978, which has not been standardized by either the Federal Housing Administration (FHA) or either of the secondary market government sponsored enterprises (Fannie Mae or Freddie Mac). This is a major problem and renders the EEM ineffective. It is unclear that a government even as influential as California's can resolve this issue. The critical feature of second lien mortgage products, such as home equity loans and the new FHA-insured PowerSaver are approval rates (greater than 60 percent), interest rates (less than 10 percent) and a streamlined process. Equity loans are far less available now, and the PowerSaver product is under development.

Unsecured products

Unsecured financing products are those for which the lender has no collateral. Some variations on unsecured finance products exist; for instance, some unsecured finance products such as "on-bill financing" offered through a utility could impose the threat of gas or electricity disconnection if finance charges are not paid.

Unsecured products fit easily into the category of dealer or vendor finance because they can be easily integrated into the sales process. The dealer or vendor finance process is a "point-of-sale" transaction. It closes quickly, with underwriting performed by the lender usually within two hours or less, based on standardized criteria such as FICO scores, debt-to-income ratios and other elements. Low-cost loan origination is matched to the small size of many loans in the residential energy efficiency sector.

The primary risk in lending is not being repaid because the borrower is unwilling or unable to make the payments. This is referred to as credit risk. If a loan is secured, with the property or other asset, the lender has recourse in that it can take possession of the asset. However, unsecured loans have no security and the lender's recourse is to sue for payment, at which time the borrower frequently declares bankruptcy. Once bankruptcy has been declared, the courts distribute assets and future income in order of claims against security, putting the unsecured lender last in the order. Unsecured products can be enhanced with a Uniform Commercial Code (UCC) filing against the actual property installed (a fixture filing). A UCC filing would, in theory, allow the lender to repossess the energy efficiency measure being financed. In practice, however, it is impractical to repossess energy efficient products such as insulation and duct sealing, compared to solar panels that are easily removable. The value of a UCC filing lies in the fact that the fixture lien will appear on a title search when the homeowner attempts to sell the property. This may help the investor or lender to settle any outstanding debt in order to remove the lien when the property is sold or refinanced.

Unsecured closed-end products

"Closed-end" financing, also known as an installment loan, is a financing product with a defined term, usually made available for a specific purpose (e.g., a five-year car loan). Typical unsecured closed-end products generally include the following:

- Same-as-cash loans (no interest/no payments for limited periods),
- Fannie Mae unsecured energy loans,
- Utility on-bill loans and on-bill tariffs, and
- Other customized loan programs offered through local financial institutions.

In general, these products are well-suited to energy efficiency financing. Table 3 summarizes their strengths and deficiencies.

Table 3. Unsecured Closed-End Finance Product Summary Evaluation

Strengths	Deficiencies
They are point-of-sale, close quickly, and integrate well into the contractor-based efficiency product and service delivery system.	Loan terms are typically 3 to 7 years, compared to secured products with 10- to 30-year terms (such as mortgages).
They can be customized to fit different borrowers' credit profiles, depending on the capital sources that fund them (e.g., generally lower scores means higher interest rates).	Typical maximum loan values are less than $15,000, limiting their ability to serve large-scale home retrofits.
Due to streamlined loan origination processes, their administration costs are low.	Unsubsidized unsecured products have interest rates in excess of 13 percent.

Unsecured revolving term credit products (credit cards)

Revolving credit projects establish a maximum amount that can be borrowed, but allow borrowers to repay and draw down the amount as they wish, so long as the maximum is not exceeded. Unsecured revolving credit products in the residential sector involve only one type of product: a credit card. Although credit cards are well-suited to many consumers' daily purchases, they typically are not suited for use in the energy efficiency retrofit market; borrowing limits often are too low to enable consumers to pay for an efficiency retrofit. Even where consumers' borrowing limits are high enough, credit cards are impractical and expensive financing options; the annual percentage rate of most credit card finance charges exceeds 15 percent.

Even if credit cards were better suited to finance energy efficiency projects, they are becoming less available to a broad spectrum of borrower credits. Nationally, the overall number of new credit card accounts has declined by about 20 percent since 2008. Credit card charge limits have declined by an even greater proportion.[13] Table 4 summarizes the strengths and deficiencies of unsecured revolving finance products.

Table 4. Unsecured Revolving Finance Product (Credit Card) Summary Evaluation

Strengths	Deficiencies
There are no separate origination fees (the cost of origination is in the interest rate).	Interest rates are high, similar to other unsecured loans, but to the extent this financing accepts lower credits, the rates are high. When this product is used to finance home improvements, it is usually subsidized by the contractor.
Terms are unspecified.	Available loan amounts are often as low as $3,000 and are too low for many comprehensive efficiency projects.
They are easy to use, highly flexible and fast.	Credit card companies are becoming more selective about offering new credit card accounts and have reduced maximum balances on many accounts.

Secured, Mortgage Products

A secured product takes a security interest in the property through the mortgage (a lien). This security interest is useful to lenders because it allows them to either repossess specific property or to foreclose on a home, giving them a way to recover value if the borrower defaults. The two most common secured products are first lien and second lien. A first lien places the lien holder first in line among all creditors except taxing authorities in the event of default. A second lien places the lien holder lower among creditors. If a foreclosed home sells for $250,000 and the combination of property taxes owed and the first lien mortgage totals $250,000 or more, then any second lien holder would receive nothing from the foreclosure sale.

Typical secured products include the following (see Table 5):

- The second lien, FHA-insured PowerSaver (a modification of the HUD Title 1 loan),
- A second lien home equity line of credit,
- The first lien, Fannie Mae Energy Improvement Mortgage,
- The first lien, FHA-insured Energy Efficient Mortgage, and
- The first lien, EPA-sponsored Energy Star Mortgage.

[13] Federal Reserve: http://data.newyorkfed.org/research/national_economy/householdcredit/DistrictReport_Q22010.pdf

Table 5: Secured Finance Product Summary Evaluation

Strengths	Deficiencies
Interest rates are lower than those for unsecured products.	Origination fees are greater than those for unsecured products.
Terms are longer than those for unsecured products.	They can take a minimum of one to two weeks to originate (not point of sale).
More money can be borrowed on secured products than on unsecured products.	Home equity-based products are of limited value for many homeowners in California Because 32 percent of all homeowners now have mortgage debt that exceeds the value of their home.
Because lenders and investors can take collateral interest in the property, they present less risk than unsecured products.	

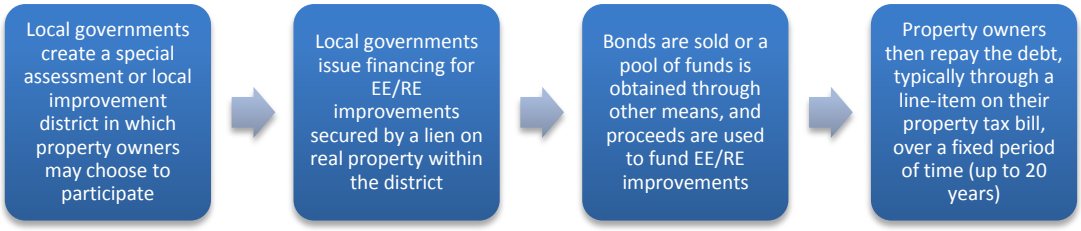
Source HB&C 2011

Property Assessed Clean Energy (PACE)

What Is PACE?

PACE financing programs, introduced by the city of Berkeley, Calif., in 2008, use special assessment districts to finance energy efficiency and renewable energy projects on private property, including residential, commercial and industrial properties. Historically, special assessment districts financed projects such as street paving, parks, open space, water and sewer systems, and street lighting. Special assessment financing districts place an assessment lien on properties (some locations must place this lien in a position that is superior to first mortgages, while others can place subordinate liens). Property owners voluntarily participate in these programs and typically repay the debt through a line item on their property tax bill.

How it Works



Why PACE?

1. Secure financing mechanism
2. Increases access to capital
3. Repayment may transfer with ownership
4. Longer repayment times than typical unsecured loans (often up to 20 years, but local government can set a longer or shorter loan tenor)
5. Lower interest rates than unsecured home improvement lending
6. Possibly a lower interest rate than home equity loans
7. Tax benefits
8. Removes the barrier of high up-front costs for property owners
9. Increased property values

Limitations of PACE

- Renters cannot participate in the programs
- Expected life of the installments must be at least as long as the repayment period and be attached to the property
- Operational and informational technology (IT) requirements for local governments
- Federal Housing Finance Agency (FHFA), the regulator of Fannie Mae and Freddie Mac, prohibited Fannie Mae and Freddie Mac from purchasing loans from jurisdictions that had approved PACE
- Interest rates will increase on primary mortgages that will become subordinate to PACE loans

Status of PACE Programs

The Federal Housing Finance Agency (FHFA) issued lender guidance that directed Fannie Mae and Freddie Mac against purchasing mortgages for properties with PACE liens attached. Subsequently, Fannie Mae and Freddie Mac notified lenders on May 5, 2010, that they no longer would accept mortgages with PACE liens. Because of this action, all residential PACE programs currently are frozen. Commercial PACE programs remain viable.

The Financing Gaps: For Which Markets is Financing either not Available or is Significantly Limited?

This section outlines the major goals that existing financing programs fail to accomplish. It identifies that financing programs: 1) have yet to be adopted on a scale necessary to support widespread and large-scale efficiency investments; 2) are not streamlined to serve households that seek loans larger than a typical unsecured loan and smaller than a second mortgage; and 3) fail to serve low- to moderate-income, poor-credit households and renters.

Although the description in the previous sections shows that a wide variety of financial products now are available in California, they have reached only a limited number of the households that have invested in energy efficiency. Gaps in the existing products fall in two categories: 1) Mismatch of products to transactions, and 2) Mismatch of products to certain market sectors.

Mismatch of products to transactions

The existing unsecured products (serving smaller projects,<$15,000)) typically have very high interest rates, partly because they have not achieved volume that would increase economies of scale and secondary market investors, both of which would reduce interest rates. Unsecured energy loans typically have unsubsidized interest rates that range from 12 percent to 18 percent. The rate is high mainly because the loan is small. For instance, the $300 origination fee can add 2 percent to the interest rate. Also, these loans have not been available in sufficient quantities to warrant securitization into the secondary market, which could reduce rates somewhat. For instance, the Fannie Mae program purchases less than 1,000 loans per month nationwide; this is not enough to achieve economies of scale or to attract investors. The DOE-funded, secondary market initiative is attempting to address this shortcoming by creating an aggregator to purchase and securitize these loans for the secondary market.

The existing secured products that serve mid-market projects (>$15,000) are not generally optimized for energy efficiency finance

As previously noted, California will likely need to focus on whole-house energy retrofits and, to some extent, on-site generation, in order to meet its zero net energy goals. This focus will require larger investments and larger projects than most unsecured energy finance products will finance. These are referred to in this report as the “mid-market” finance products—those larger than $15,000 and smaller than the amount typically financed through a second mortgage. It is difficult to define the upper limit of this “mid-market” because it varies according to home values, home equity, credit and other factors. Although home investments of this size often have been financed through a home equity loan or a second mortgage, the decline in home equity in California due to the 2008 housing market crash has made these products much more difficult to obtain in recent years.

The need for this product is not yet critical because whole-house projects are not being sold in volume. However, the most appropriate product to serve this “mid-market” segment would have a faster loan underwriting and origination process and lower cost servicing to reduce interest rates. Recently, HUD announced the availability of a new FHA-insured product, the PowerSaver.

FHA POWERSAVER Feature	Beneficial Characteristic
Interest Rate	8.99% (estimate)
Loan Term	Term is 15 years (20 years for renewable energy improvements)
Maximum Loan Size	Maximum loan amount is $25,000
Security	The lien, if any, securing the loan must hold no less than second lien position.
Origination and Underwriting	FHA-approved Title I lenders. FHA-approved Title II lenders may obtain Title I eligibility under an expedited process. Non-approved lenders may apply to become an FHA-approved lender through the current process. Maximum combined loan to value ratio (CLTV) of 100 percent. Minimum 660 credit score. Borrowers may not have a prior bankruptcy or foreclosure in their credit history. No more than 1x30 on any senior mortgage in past 12 months. Maximum 45 percent debt-to-income ratio.
Consumer Protection	As a home improvement mortgage, very good consumer protection
Finance Product Marketing	By FHA-approved lenders
Integration with Utility Rebates	Not yet
Integration with Contractor Certification	Not yet
Energy Audits	Not yet
Contractor	The PowerSaver does not allow dealer loans

Mismatch of products to market sectors

Low- and moderate-income households and households with low FICO scores find it challenging to take out new loans because typical credit evaluation criteria based on FICO scores or debt-to-income ratios exclude them from many loans. Consumer credit lending markets have tightened since 2009, making it still more challenging for these borrowers. Traditional market-based lenders such as banks and credit unions typically are reluctant to lend money to borrowers with low FICO scores or fall short of other related underwriting criteria. Table 6 illustrates the relationship between FICO scores and delinquency rates and also shows the percentage of the population in each FICO score band. Note that delinquency rates increase significantly as FICO scores decrease. Also note that FICO scores of above 700 capture 58 percent of the population, and FICO scores above 650 capture 73 percent of the population.

Table 6. FICO Scores Correlated with Percent of Population

Percent of People	Score	Delinquency Rate Projected (historical performance)
2%	300-499	87%
5%	500-549	71%
8%	550-599	51%
12%	600-649	31%
15%	650-699	15%
18%	700-749	5%
27%	750-799	2%
13%	800-850	1%

Source: TransUnion (national data), 2009.

Financing products currently do not serve low- or moderate-income households or households with poor credit

The underwriting for almost all consumer and dealer finance products includes a debt-to-income limit of typically 45 percent to 50 percent of gross income. Potential borrowers with lower average incomes will frequently exceed this limit and may not qualify for financing. In addition, the underwriting for all consumer and dealer finance products evaluates the borrower's credit history on the basis of a credit score. Potential borrowers who have frequent late payments and substantial legal judgments in their credit history will score low in this evaluation and will be denied credit.

The credit evaluation guidelines that lenders use are required by capital providers for use of their capital for lending. Typical market-based capital providers such as Wells Fargo, GE Capital, Fannie Mae or others will lend on the basis of credit scores as low as 640, 680 or higher.

As a rule, traditional financing products do not reach people whose credit quality does not allow them to borrow. It may or may not be a desirable policy goal to add to the debt load of these people. Many fail to qualify precisely because debt-to-income ratios indicate their debt load already is too large and they should not assume new debt.

Financing products currently do not serve renters

Although it is unlikely that many renters will seek to improve the energy efficiency of their landlord's property, many energy finance consumer loans require that the borrower be a property owner. In addition, the incentives inherent in most tenant-landlord relationships discourage either party to invest in energy efficiency; a split incentive means the landlord would have to pay for the energy efficiency investment. Unless it is a rare case in which a landlord pays the tenant's energy bill, however, the landlord would realize no immediate financial benefit from the efficiency investment.

Financing products are limited in how they serve contractors

Contractors who install energy efficiency projects will be required to increase the size of the typical job they perform in order to meet the greater need for whole-house projects and for zero net energy projects. Many of these projects will require contractors to purchase materials and other equipment and wait for some period of time while utility rebates and loan payouts are processed. Contractors report that, particularly as project size increases, it becomes more difficult to meet working capital needs. No easily accessible working capital line of credit currently exists for contractors.

Characterization of Ideal Finance Product or Products

Table 7 illustrates the key components of a financing product and describes the ideal characteristics of each.

Table 7. Characterization of the Ideal Residential Sector Efficiency Product

Finance Product Feature	Ideal Characteristic
Interest Rate	Customized to fit needs of the target market; reduced rate to provide incentive for whole-house retrofits. In current market, 9 percent or below is ideal for a non-incentivized rate on unsecured loans; 6 percent or below is ideal for larger projects.
Loan Term	Option for term to be as long as possible in order to amortize loan amount over longer period and reduce monthly payments. Increasing the term from five years to 10 years reduces the payment by almost 50 percent.
Maximum/Minimum Loan Size	Maximum loan size for unsecured loan approximately $15,000. Secured loans from $15,000 and greater. Minimum loan size $2,500.
Security	Appropriate to loan size and to credit of borrower. Unsecured loans appropriate for credit scores greater than 640 and loan amounts less than $15,000. Secured loans appropriate for

	larger loans or to provide financing to lower credit-score applicants.
Origination and Underwriting	Fast origination is required in order to not lose the customer at the point of sale. Simple underwriting for unsecured loans, based on credit report and debt-to-income ratio. Existing unsecured loans have very low cost, quick turn-around underwriting. Underwriting for first mortgage loans is slow and complex, but borrowers are familiar with and accept the process. Underwriting process for the second lien product for mid-amount projects may be too slow for this market.
Consumer Protection	Adequate disclosure of rates and terms to borrower. No prepayment penalties or hidden fees.
Finance Product Marketing	Integrated with and accomplished through established networks of contractors; supported by utility, state or other marketing efforts.
Integration with Utility Rebates	Loan amounts to be net of rebate.
Integration with Contractor Certification	Contractors should be qualified and certified in order to participate in the finance program. Failure to abide by program rules should result in a warning or suspension from program.
Finance Product Feature	Ideal characteristic
Energy Audits	Multi-tier program: Audits required for whole-house efficiency retrofit projects. Audits not required for single-measure program. Allow audit cost to be rolled in to financing. Fast and streamlined audits highly desirable.[14]
Contractor	Minimize amount of time between work authorization and payment to contractor.

Source: HB&C 2011

Which financial product types are most appropriate for the energy efficiency transactions?

Table 8 summarizes the major features of the four primary financial product types offered in today's market (described above in Section 2.).

Table 8. Major Features of Financing Products

	Unsecured		Secured	
	Revolving	Closed End	2nd Lien	1st Lien
Loan Term (years)	n/a	1-10	Up to 20-30 years	Up to 30 years
Interest Rate	>15%	12.75% – 17%	6%	6%
Time to Originate	None	<2 hours	Days-Weeks	Days-Weeks
Minimum Credit Score		640	Varies	Varies
Maximum Loan Size		$15,000	Depends on home valuation, borrower loan to value, credit	
Security	None	None	2nd position	1st position
Fees to Borrower	None	Typically none	Varies from 0 for small loans to thousands for traditional purchase mortgage or refinance	

Source: HB&C 2011

[14] Most capital providers base their investment decision on the credit quality of the borrower, the security of the repayment stream (collections), and the ability to recoup part of the capital loaned out in the event the borrower defaults. Energy audits and projected energy savings are part of the underwriting procedure only in exceptional cases.

Table 9 presents an overview analysis of how well these unsecured or secured finance products meet the needs of the energy efficiency market. The conclusions from this table are that:

- Unsecured loans are most appropriate for financing to pay for equipment replacement, for single-measure energy efficiency retrofits, or for whole-house retrofits where the total cost of the retrofit is below $15,000.
- Secured, 2nd lien products can be most appropriate for higher-cost projects such as whole-house retrofits with multiple measures installed or for whole-house retrofits combined with some on-site generation.

Table 9. Loan Products Mapped to Efficiency Project Types

	Unsecured		Secured	
	Revolving	Closed End	2nd Lien	1st Lien
Single-Measure Retrofit or Equipment Replacement	Often exceeds credit limits; products financed such as heating system replacement, interest rates typically high but subsidized by lender	Somewhat longer terms and lower rates than revolving credit, combined with lower cost, can make this option attractive	Origination time often makes this impractical for equipment replacement but OK for whole house	Origination time and fees often make this impractical, especially for equipment replacement, unless done as part of a refinance or purchase
Whole-House, Multi-Measure Efficiency Retrofit with Some On-Site Generation	Exceeds credit limits in almost all cases; interest rates prohibitive	Very often will exceed credit limit; interest rates may be too high in some cases	Lower rates and longer terms make this attractive; the requirement for a property assessment slows down the process.	Lower rates and longer terms make this attractive; origination time and fees are problematic if not done as part of a refinance or home purchase

Section 3. Recommendations for Residential Financing

This section presents a set of recommendations based on the previous description of financing products and the discussion of gaps. The two major recommendations are:

1. Acknowledge that one form of financing is insufficient to meet the needs of homeowners participating in various transactions (e.g., replacing failed HVAC, buying a whole-house retrofit, buying or refinancing a home, etc.).
2. CPUC should work to make the three core single family residential loans (unsecured, first lien and second lien), available to homeowners in California.

General Principles

These recommendations are based on the following basic principles:

- No single financing product will meet California's needs. A portfolio of financing products is appropriate to meet the financing needs for different project sizes and different credit profiles.
- Many households will not qualify for energy efficiency loans, but approval rates over the last decade have run at approximately 65 percent approval, which should be sufficient for the single family residential market. The multifamily market (approximately 40 percent of total California housing, would be evaluated under commercial underwriting standards.
- Whole-house improvement projects that may incorporate on-site generation are the transactions most likely to be financed and most important to help California achieve its energy efficiency goals.

Recommendations

This section suggests eight recommendations for financing, organized according to the gaps described above in Section 2. Table 10 below summarizes these recommendations in reference to the identified gaps. In turn, the recommendations are described in further detail below.

Table 10. Summary of Gaps

GAP	Recommendation
Mismatch of products to transactions (unsecured)	1., 2., 3., Provide loan loss reserve and create a secondary market to reduce interest rates
Mismatch of products to transactions (secured)	3., 4., 5., Streamline the origination process to allow fast turn-around times, similar to point of sale
Mismatch of products to market sectors (poor credit)	6., 7., 8. Use alternative sources of capital that will accept below market returns, use unconventional underwriting to evaluate credit data
Mismatch of products to market sectors (renters)	6., 7., 8. Use alternative sources of capital that will accept below market returns, use unconventional underwriting to evaluate credit data
Mismatch of products to market sectors (contractors)	6., 7., 8. Accelerate the funding process to maximize contractor's cash flow, provide working capital, pay start-up and progress payments

In the summary of gaps above, the primary focus should be on the first two gaps, the remaining three gaps are secondary and relate to sub-markets.

GAP: Mismatch of products to transactions: The interest rates of the existing unsecured finance products that serve the small loan market (<$15,000) are very high

As described above, the double-digit interest rate on existing unsecured finance products are too high to satisfy the average homeowner who is used to single digit mortgage interest rates and equity line interest rates to attract large-scale participation. As described below, this gap can be addressed by lowering the cost of funds by selling into the secondary market, lowering origination and servicing costs through increased volumes, and lowering default rates through better underwriting.

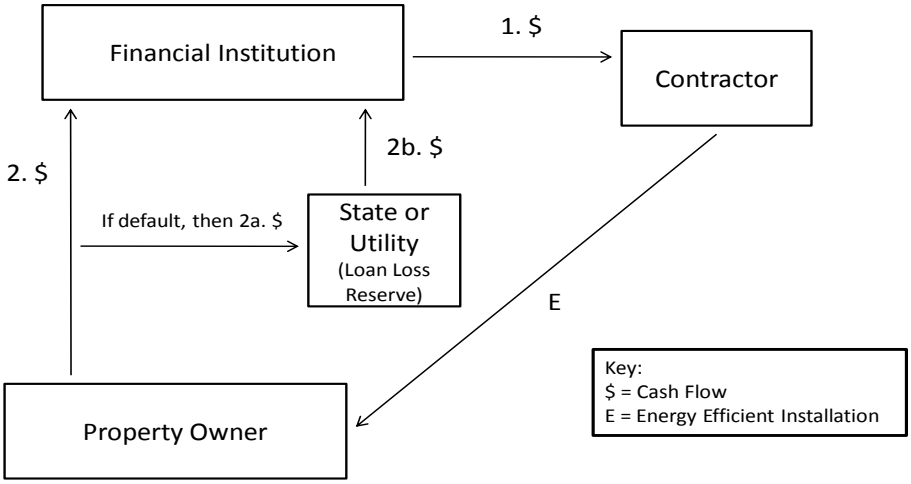
Recommendation 1. Provide a loan loss reserve to support unsecured lending with a secondary market take-out option

Summary: California should create a loan loss reserve structure to attract private capital to an unsecured lending program. Further, California should examine the possibility of participating in the WHEEL (Warehouse for Energy Efficiency Loans) program. A DOE-funded initiative, WHEEL attempts to create a secondary market for unsecured energy efficiency loans (see Section 2.) or a similar secondary market structure such as a state-by-state secondary market through Community Development Financial Institutions (CDFIs).

Credit enhancements absorb a portion of the risk that capital providers must assume when they fund a loan. One structure is a loan loss reserve, whereby a third party (that could be a utility, with ratepayer funds; the state; or other entity) covers a limited portion of any losses from a loan portfolio. This structure caps the size of the third party's exposure to losses at the size of the loan loss reserve, leaving the capital provider to cover any losses beyond that. The capital provider sets the interest rate and terms on its loans to account for its assessment of the risk of losses above and beyond the size of the loan loss reserve. An additional benefit of this structure is that if a loan loss reserve is usually not fully consumed by bad debt, the remaining portion may be available for other purposes at end of the loan term, (e.g., if actual losses are less than reserve amount).

The following flowchart describes the basic structure for a loan loss reserve or other type of credit enhancement structure.

Residential Loan Loss Reserve



In this chart:

1. A financial institution with point of sale financing pays contractor directly for work completed on a home.
2. The property makes monthly payments to the financial institution (principal and interest).
    a. If the property owner defaults on its loan, a loan loss reserve fund established by the utility or government covers the loan loss amount.
    b. The loan loss reserve reimburses the financial institution.

This structure leverages the loan loss reserve because it relies on capital that financial institutions provide. Typical leverage amounts are about 10:1, so a $10 million reserve would create a $100 million loan fund. Based on our calculation, California homeowners would need to install approximately $3 billion of improvements to meet its goals. Assuming that 50 percent of homeowners used financing, $1.5 billion in loans would be originated per year. This would require a $150 million loan loss reserve that would be replenished each year.

The money to fund loan loss reserves could come from utility ratepayers, federal funds in the form of Energy Efficiency and Conservation Block Grants (EECBG) or State Energy Program (SEP) funds. The size of a loan loss reserve varies. Under some models, however, setting aside 10 percent of the value of a loan portfolio can stimulate benefits to an energy efficiency lending program.

Capital providers, in exchange for these credit enhancements, offer unsecured loans with characteristics that are closer to the ideal financial product described above. Table 11 provides an estimate of benefits capital providers might be expected to produce in exchange for a credit enhancement.

Table 11. Benefits of Loan Loss Reserve for Unsecured Loan

	Without Loss Credit Enhancement	With Credit Enhancement	Benefit
Interest Rate	14% and higher, depending on credit score and capital provider	6% to8% where lender subsidizes rate; 9% market-based rate	Reduced borrowing cost makes energy efficiency more affordable
Loan Term	5 to 7 years	10 to 12 years	Extended amortization may make it possible for monthly financing charges to approximate energy savings
Credit Score Minimum	Varies, 700 and up is typical	Varies, but could extend down to between 640-680	Extends number of eligible borrowers, adding an additional 15% to the pool of qualified borrowers
Debt to Income	Varies, 40% possible	50%	Extends number of eligible borrowers, particularly among lower-income population

Source: HB&C, 2011

Case Study: The State of Michigan, through a new program called Michigan Saves, is offering 7 percent, 10-year term loans by providing a $3 million, 5 percent loan loss reserve to support $60 million of lending through eight credit unions. Information is available on this program at www.michigansaves.org. The credit unions have agreed to use a contract loan originating service and uniform underwriting to help streamline and standardize the origination process. The loans are serviced by the individual credit unions. Credit unions file claims with the loan loss reserve to recover losses from loan defaults.

A loan loss reserve shifts risk exposure to the provider of the reserve, thereby lowering the return requirement of the source of funds. For unsecured energy loans, this represents typically 3 percent to 5 percent, which is otherwise added to the note rate. This structure, in and of itself, is likely insufficient to produce the significant amount of capital required to fund California's energy efficiency investments because it will reduce note rates only from around 14 percent to around 10 percent. A 10 percent interest rate is an acceptable one for a consumer who must take an action (replacing failed HVAC), but it is not an incentive.

The structure of this unsecured, credit-enhanced efficiency financing option is that capital providers will do the following:

a. Assess, quantify, and then price the loans based on projected losses. Capital providers typically will compare unsecured energy efficiency loans to other unsecured lending products.
b. Compare the size of the loss reserve to those projections and adjust loan interest rates based on the size and terms of the loss reserve (lower rate, longer term, flexible underwriting, etc.).

Individual investors in unsecured loans will be unlikely to hold large volumes do to the credit risk (defaults) associated with this product. However a credit-enhanced version will be more attractive to investors and will increase the volume they will be willing to hold. If the loans could back securities (ABS, asset backed securities) and be sold throughout the capital markets, risk will be disbursed further and the cost of funds should fall.

To mitigate the problem cited above, California should consider participating in a structured secondary market being developed by The Energy Programs Consortium and funded by DOE that was established in part to provide a platform to manage loan loss reserves for states and possibly other advocates of energy efficiency.

Recommendation 2. Support a secondary market for unsecured loans

Summary: Current unsecured lending models generally require that the lender originate and hold loans until they mature. Under this structure, a loan with a five-year maturity repays principal, weighted toward later payments, over the life of the loan. Unlike a loan that is sold into a secondary market and replenished funds for lending immediately, these principal of these loans will not be readily available for re-lending.

A new and developing model allows lenders to sell their loans to a secondary market, then immediately put the proceeds of that loan sale into new energy efficiency lending. Loans sold into this secondary market need to conform to standard underwriting and other criteria [see examples below] that are similar to the Fannie Mae loan underwriting criteria; loans that do not meet this criteria cannot be purchased. An additional feature of these loans is that they must be sold to the secondary market with some type of credit enhancement. A third party such as a state or a utility sets aside funds to cover the eventuality that some loans may default.

Several states and some utilities—including Iowa, North Carolina, UniSource Energy in Arizona, and Connecticut Light and Power, among others—are selling loans that conform to these underwriting criteria to a single purchaser—the Pennsylvania State Treasurer through its newly established WHEEL program. The WHEEL program will bundle the loans from these states and sell them to investors.

GAP: The existing products that serve moderate cost projects (>$15,000) are not generally optimized for energy efficiency finance

To increase the availability of first lien (Energy Efficient Mortgages) and second lien (PowerSaver) energy loan products that can fund larger amounts, California should:

- Participate with other states in an initiative to identify all loans that fund ENERGY STAR® homes. Once the performance of these homes is documented and the information shared with the mortgage finance industry, the secondary market will have data to support providing preferential terms for homes with ENERGY STAR® ratings.
- Participate in HUD's PowerSaver pilot program in order to build volume for this new product and make it workable for the California marketplace.

These products allow much larger loan amounts and longer terms to fund both energy efficiency improvements and on-site generation. Customers have been limited to either a home equity loan or a second mortgage.

Recommendation 3. Create a finance product with a partial guarantee

Summary: An alternative to a loan loss reserve is to provide credit insurance under which lenders could file claims on defaulted loans and be reimbursed a percentage of the loan loss amount.

Capital providers for loans to serve an unsecured lending program such as that described above will offer an interest rate and terms for that loan on the basis of their assessment of the credit risk of the individual borrowers who are likely to take out that loan, adjusted for any available loan loss reserve.

An alternative to this structure is to establish a partial guarantee of a pre-set dollar amount of loans. Under this structure, instead of looking to the credit of individual residential borrowers, the capital providers will develop rates and terms based on the credit of the guarantor, such as a state government or utility company. This structure also provides a route to access the capital markets through a bond issuance. Without the guarantee, capital markets will be less likely to be interested in funding such a program. One model for this structure is the U.S. Small Business Administration loan

guarantee program that typically guarantees up to 80 percent of qualified loan amounts originated by qualified lenders. The program does not offer a 100 percent guarantee; it leaves an incentive for the lender to originate, service and collect according to industry best practices, because the lender is still exposed to a loss on the loan.

This structure has the advantage of providing capital to the ultimate residential borrower at a rate approaching the borrowing costs of the utility, plus any related costs to service the loan. The approach also could provide a way to offer longer-term loans for larger amounts than would be possible if the credit were offered only on the basis of an evaluation of a residential borrower's credit.

This approach has potential, but it also will face challenges. Uncertainties include its effect on a utility's or state's credit rating of an ill-defined risk on its balance sheet and the effect on both a utility's ability to borrow and its cost of borrowing. As a result, the size of such a loan pool would likely need to be limited to a small percentage if its assets, and the terms of the guarantee would need to be clearly defined. These are significant hurdles that would need to be addressed when pursuing this approach.

Case Study: Illinois utilities are offering an on-bill loan program for the residential sector, set at a total of $12.5 million statewide, through which participating utilities will assume 100 percent of the losses of defaulted loans. The utilities will account for these losses as a cost of DSM programs, recoverable with other DSM costs. As of this writing, the interest rate to the borrower is unknown because negotiations are in progress with various capital providers.

Recommendation 4. Participate with qualified lenders in the HUD PowerSaver Secured Loan Program

Summary: California governments, utilities and other entities can participate in a new, second-lien mortgage product backed by the U.S. Federal Housing Administration. The PowerSaver product, developed by U.S. Department of Housing and Urban Development (HUD), is a home improvement loan specifically targeted to energy efficiency with the following features and benefits:

- Lower interest rates than unsecured loans;
- Greater loan amounts than unsecured loans (up to $25,000);
- Longer terms and greater loan amounts than unsecured loans;
- Lower closing costs than a first lien mortgage; and
- Lower risk to investor because FHA assumes the 90 percent of the loss per loan and 10 percent of the loss per portfolio (all loans originated in a set time period).

The program is in the pilot phase at the time of this writing, and some details of origination and servicing have yet to be established by FHA. In addition, the PowerSaver program is not a point of sale loan product; the contractor can refer borrowers to the lender but cannot participate in the process. Also, the PowerSaver requires a title search, appraisal and notary at the settlement, a process that generally takes three to four weeks. Consequently, PowerSaver would not be suitable for the HVAC replacement market, which requires very short approval and funding times. The PowerSaver would be a very effective source of funds for whole house retrofits, however, because its maximum loan amount of $25,000 and 20-year term will minimize the monthly payment.

Recommendation 5. Promote energy efficient mortgages (first lien mortgages)

Summary: California should consider participating with other states in an initiative to label all loans that fund ENERGY STAR® homes and to encourage the secondary market to reward homes that demonstrate reduced energy use as a result of ENERGY STAR® ratings.

The mortgage market provides loans to homeowners and prospective homeowners to buy (purchase money) and refinance (money to refinance) both new and existing homes. Because of the efficiency of the market and the high value of the collateral, a mortgage provides the lowest rate, the longest term and the greatest loan amount of any

financial product available to the residential market. This presents an opportunity to lend mortgage borrowers additional funds to finance energy-related improvements.

The home finance industry has responded to this opportunity with the energy efficient mortgage for existing homes (for both "purchase" money mortgages and refinancing mortgages) and for new construction. These products were designed to recognize the cash flow freed as a result of energy savings by increasing allowable debt-to-income ratios and loan-to-value ratios. However, according to anecdotal evidence from EEM advocates and lenders, as most borrowers interested in energy efficiency tend not to be first-time homebuyers and "bring" equity to the transaction (because they had cash from their previous home), the increased ratios did not create substantial energy efficient mortgage volume.

During the last decade, the energy efficiency industry has argued for an enhanced energy efficient mortgage that would also offer lower interest rates. The rationale is that borrowers will have improved cash flow and lower delinquency and default incidence and, in the event of a default, an energy efficient home should command higher market value, providing better collateral and lower losses.

To prove this theory, the energy efficiency industry has attempted to identify mortgages used to fund energy efficient homes (frequently branded as ENERGY STAR® Homes) and asked the secondary market to evaluate the performance of these loans. Fannie Mae, which recently performed such an evaluation, stated that the initial results were inconclusive, partly due to lack of sufficient data.

The U.S. Environmental Protection Agency and the New York State Energy Research and Development Authority (NYSERDA) recently funded an effort to promote use of the ENERGY STAR® label on mortgages for new ENERGY STAR® homes or existing homes in which energy efficiency has been improved by at least 20 percent. The labeling will offer the benefit of indentifying these loans in the secondary market so that the industry can evaluate loan performance.

GAP: Mismatch of products to market sectors— financing products do not serve households with poor credit

Low- to moderate-income households in each of the above categories can find it challenging to borrow money from traditional lenders because of restrictions that capital providers place on the use of their funds.

Recommendation 6. Develop financing products to reach borrowers with low credit scores

Summary: To the extent that funds are available to subsidize losses, loans can be originated to borrowers with low credit scores (below 680). A less restrictive underwriting program also could include:

- Alternative underwriting standards based not only on traditional FICO scores, but also on utility bill payment history; and
- Flexible payment mechanisms that may allow borrowers to skip a payment from time to time without incurring "delinquency" status or penalties.

This examination should be conducted in the broader context of whether people with poor credit scores or high debt levels can assume additional debt. It may not be desirable to burden people in this situation with new debt.

Lenders often originate unsecured loans down to 640 FICO score and secured loans to 600 FICO score. Table 7 noted the sharp increase in projected delinquencies for these lower-credit-score borrowers. However, lenders are unwilling to loan to lower scores because the losses are too great to be covered through an interest rate increase for only the lower-credit borrowers. Consequently, rates must be raised for all borrowers, making the interest rate high and uncompetitive for more creditworthy borrowers.

An alternative is to use subsidized or non-market capital such as:

- Grant or foundation funds;

- Federal funds such as HOME (HOME Investment Partnership Program is the largest federal block grant to state and local governments designed to create affordable housing for low-income households) or CDGB (Community Development Block Grant funded by HUD for local community development activities—affordable housing, anti-poverty, infrastructure development. Funds are used at the discretion of state and local governments and sub-grantees);
- Utility ratepayer funds.

To the extent these capital sources could be used as loan capital to support financing programs for borrowers with lower credit ratings, the higher percent defaults would result in lower returns. However, these capital sources would be more flexible than the traditional market-based lenders.

Case Study: Indianapolis, Indiana, used DOE Better Buildings funds to create a loan program designed specifically for the needs of a lower-income neighborhood in the center city. Working with the city, four banks created a mix of secured and unsecured lending products through a partnership with INHP, (Indianapolis Housing Partnership), a local community development lender. Local financial institutions have agreed to loan funds to INHP that, in turn, will lend money to residents of this low-income neighborhood. The city will use its DOE funding as a 50 percent loan loss reserve.

Detail of Midwest Energy How$mart Program:

Program	**How$mart**
Program Administrator	Midwest Energy Inc.
Start Date/End Date	2007-current
Eligible Sector(s)	Residential and Commercial
Eligible Measures	Insulation; Air sealing; HVAC
Capital Source	Utility Funds and Kansas Housing Resources Corporation
Financing Term Maximum	Residential: 15 years or ¾ of the expected life of the measure, whichever is less; Commercial: 10 years
Customer Charge Calculation	Residential: 5.05%; Commercial: 6.6% In addition, a fee of 5% of project investment is added to the principal balance owed. Customer monthly charges will not exceed 90% of the projected energy cost savings.
Disconnection for Non-Payment	Yes
Disclosure and Lien	UCC fixture filing lien placed on property; disclosure of payment obligation required at sale.

Recommendation 7. Investigate the development of on-bill financing and/or collection

Summary: California should study the advantages of on-bill financing in the residential sector, including programmatic recommendations about how to structure such a program.

On-bill financing is addressed in the chapter on small commercial financing, although it also is an option for the residential market sector. In general, on-bill finance can be structured in one of four ways:

1. Using third-party capital, a utility conducts loan origination, collection and servicing and does so under a tariff, whereby the obligation to pay financing charges transfers with the obligation to pay the energy bill on the property.
2. A utility provides loan capital, origination, collection and servicing, but the financing is structured as a personal loan that does not transfer with property occupancy.
3. A utility provides a credit enhancement, while a third party provides loan capital. The utility conducts servicing and collection and distributes principal and interest payments to the capital provider upon receipt.
4. A utility provides credit enhancement, and a third party provides loan capital. The utility provides invoicing service through the utility bill, but the capital provider/lender collects from the borrower through an automatic payment system.

On-bill financing, particularly when structured as a tariff-type program in which the repayment obligation passes from one household occupant to the next, is one of the few financing mechanisms that has been shown to serve the rental housing market. Midwest Energy, a Kansas-based utility, uses a tariff-based approach, and close to 15 percent of program participants are renters.

Depending on the design of the program (ratepayer vs. shareholder vs. third-party funds, tariff vs. loan, shut-off authority or not, due on sale of home or not, etc.) on-bill financing may trigger legal or regulatory issues and would have to address:

- How to handle partial payment: Is the utility or the lender/investor paid first?
- If the utility is providing a loan, it would be held to state and federal regulations such as the Truth in Lending Act (TILA) requirements.

- Whether to collect remittances through the utility bill and subcontract the other servicing activities, processing payments, paying and reporting to investors, performing collections activities such as delinquency management and charge-off.
- Responding to political pressure related to entering the domain of banks and finance companies.
- The legal and regulatory authority and political/policy acceptability for the utility to disconnect customers who do not pay the financing component of their energy bill under an on-bill structure.
- The advantages and disadvantages of each structure itemized above.
- The potential of such a program to serve the rental housing market in California.

Recommendation 8. Promote collection and dissemination of loan level performance data for unsecured and second lien energy loans

Summary: California should seek to participate in efforts to acquire and distribute loan level data on energy loan performance (this would not include information that would allow identification of an individual borrower). California also should seek to coordinate with other states and the federal government to collect and make available this data to lenders and investors.

Lenders and investors are relatively new to the energy efficiency lending business and are still attempting to understand the risks of the business. Although general experience indicates that the credit quality of an energy efficiency loan is good, insufficient evidence and data yet exist to fully prove this idea to the financial community.

Chapter 3. The Government and Institutional Market Sector

This chapter is divided into three sections: 1) The investment required to meet California's goals; 2) A description of financing products available in California; and 3) Recommendations for enhancing existing or creating new products.

Section 1. The Investment Challenge

Market Characterization

For the purposes of this report, government and institutional properties are defined as properties owned and operated by local, state or government entities and all nonprofit institutions. Approximately 5,714 properties in California meet this description. [15]

Typical Energy Efficiency Upgrades, Costs and Savings

A typical energy efficiency project can be expected to achieve reductions of 25 percent[16] of the annual energy consumption at a cost of approximately $2 per square foot[17]. To estimate the total investment required to achieve energy savings by 2015, HB&C determined that the government and institutional market sector represents about 12 percent of the square footage of the total nonresidential sector. Our calculations indicate that to achieve the California commercial sector (all non-single family residential, non-industrial) goals will require an annual investment of approximately $3 billion (Appendix C).[18] Therefore, an investment of approximately $210 million per year in the government and institutional sector would be required.

The 2008 Lawrence Berkley Labs study by Charles Goldman indicates that 3.5 ESPC projects were completed in California each year from 2001 to 2008, representing an annual ESPC investment of $4.1 million per year.[19] This report also indicates that, as of 2008, energy service projects in state buildings were saving $360,000 of the $694 million annual energy bill. HB&C was unable to locate data to estimate the project volume of impact of CEC or EECBG programs or of the leasing market for state facilities, nor were we able to find data on local government uptake of energy services.

Opportunities

- ***The "technical" opportunity is good***

Government and institutional property owners typically are held to tight operating budgets and are not able to borrow funds unless they successfully complete numerous levels of approval. Consequently, government and institutional properties often are characterized by deferred maintenance and inefficient, failing or obsolete equipment.

- ***The "economic" opportunity is good***

A 2009 McKinsey & Company study, *Unlocking Energy Efficiency in the U.S. Economy*,[20] stated that, on average, 27 percent of building energy use could be avoided with a 4.25 year payback.[21] HB&C believes the California buildings in this sector are representative of the McKinsey findings and provide a good opportunity to achieve that level of return.

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[15] Appendix B
[16] Appendix B and McKinsey & Company, Unlocking Energy Efficiency in the U.S. Economy, 2009; http://www.mckinsey.com/clientservice/electricpowernaturalgas/us_energy_efficiency/.
[17] Appendix B
[18] See appendix: Annual Energy Investment Required for California to Achieve it Energy Saving Goals in each Market Sector
[19] Performance contracting and Energy Efficiency in the State Government Market, C. Goldman etc. Nov 2008
[20] McKinsey & Company, *Unlocking Energy Efficiency in the U.S. Economy*, 2009; http://www.mckinsey.com/clientservice/electricpowernaturalgas/us_energy_efficiency/
[21] Ibid.

- ***The "market" opportunity is good***

Performance contractors/ESCos serve the government and institutional markets by proposing the use of tax-exempt municipal leases to finance energy-related capital improvements with guaranteed savings to insure positive cash flow. Many government and nonprofit property owners find this value proposition compelling, particularly when viewed from their capital deficient, maintenance-deferred environment.

- ***Government and institutional property owners want to project a green image***

Many property owners work to establish a "green" image by minimizing energy consumption, managing waste and reducing water consumption. They believe an aggressive, well-publicized energy efficiency program can communicate to the organization's constituents that it is forward-thinking and willing to take action. Therefore, presenting these owners/managers with a source of funds to finance a major project—especially if the funding can be done with a low-cost source of funds such as tax exempt municipal leases that include a "subject to funding" clause (and constitute an operating cost)—may be a very attractive proposition.

Challenges

- ***Government and Institutional officials rarely push back on annual requests to fund the energy budget***

Energy bills are paid from funds allocated during the annual budget process. During the budget process, it is rare that the departments get "push back" on attempts to pay its energy bill. Therefore, it is often easier to acquire funds to pay the energy costs than to seek capital expenditures for major improvements. Consequently, it is not unusual for government entities to focus their attention on areas that are difficult to fund, such as filling new positions, upgrading information technology and training.

- ***Lack of technical assistance and procurement service support***

Once a government or institutional property owner has received approval to acquire capital improvements, it must follow complex procurement procedures that require development of plans and specifications, bidding, contracting and project management. As a result, the planning, funding and procurement process provides numerous disincentives to developing projects. Although these requirements are not unique to energy efficiency projects, it is unique is that the result of a successful energy project is mostly a reduced spending in a budget line item—no employee is earning more or working less, no new services for the public have been created, no one has a new vehicle or a better office, etc. In other words, the benefits from energy efficiency are mainly economic and flow back to the taxpayer rather than to the government body, making it difficult for energy projects to compete against capital projects that offer direct benefits to the government entity.

- ***Many property owners do not embrace the ESCo business model***

Many government and nonprofit property owners believe that the ESCo model encourages a focus on short payback improvements ("cream skimming") and provides high margins for ESCos. Consequently, these owners prefer to perform energy projects with design engineers, using plans and specifications and low-bid procurement. ESCos are free market economic entities and above all seek to make money. While they do so by saving energy, the push-pull of big dollar projects with smaller return vs. smaller projects with a higher return, is always at play. Therefore, the consumer must be educated and must manage the transaction. Many states, including Kansas, Massachusetts and Pennsylvania, have done this effectively by creating an education and process template for all government entities.

Section 2. Analysis of Existing Financing Products

This section provides the following analysis: 1) A description of the existing financing products, their strengths and weaknesses; 2) Identification of "gaps" in how these products serve the market; and 3) Discussion of how to fill the "gaps."

The financial instruments for funding government and institutional energy efficiency projects can be divided into debt and non-debt options.

1. Debt Options (On-Balance-Sheet Financing)

a. Bank loans
b. Municipal government loans to Institutions (possibly secured with PACE liens)
c. State or local government loans funded by bonds
d. Utility loans (often collected on-bill)

2. Non-Debt Options (Off-Balance-Sheet Financing)
    a. Lease financing
    b. Service Agreements (Energy Services)
        i. Provided by ESCos (shared savings or discount energy cost contracts)
        ii. Provided by utilities (on-bill tariff, funded/owned by utility)

Description of Financing Products

Debt options

Debt options are on-balance-sheet obligations of the property owner to repay a principal amount with fixed or variable interest over a fixed or variable time period.

Bonds: General obligation bonds

A state or local government can issue general obligation bonds backed by the government's ability to tax its residents. The interest rate paid is a function of the government's bond rating, term and security, but funds generally would be available at 3 percent to 4 percent for a period of 20 years. Because origination costs can be significant, it often may not be economical to issue bonds in amounts less than $10 million.

Bonds: QECBs

In 2009, Congress allocated $3.2 billion of tax credit energy bonds to states. California's allocation was $381 million. Approximately $130 million of that amount remains available. While this is a very small amount relative to the multi-billion dollar investment opportunity, it does represent a source of low-cost funds for efficiency and renewable energy projects and should be made available to support the state's initiatives.

Loans: bank loans

Bank loans are available to government and institutional customers, but municipal governments generally seek funding from tax-exempt sources such as bonds and leases.

Loans: utility loans

Utility loans offered to this sector may include such features as on-bill collection, but it would seem preferable to reserve utility financing for less creditworthy commercial borrowers that cannot qualify for low-rate, tax-exempt financing.

Strengths of Debt Options	Weaknesses of Debt Options
Loans can be structured with a wide range of rates and terms.	The capital budget process used by governments and institutions to approve new debt is cumbersome and often requires voter approval.
Cost for loan origination is lower than bonds.	Local governments may not qualify for additional debt.
Many commercial lenders are interested in funding loans to high-credit-quality governments.	Additional debt may create issues for many nonprofits (limiting access to capital in the future).

	Debt service payments are required even if savings are not achieved.

Non-debt options

Leases: tax-exempt financing for municipal governments and non-profit organizations

Tax-exempt lease financing has emerged as the most common source of funds for government and institutional energy efficiency projects. This structure provides low rates, flexible terms and low closing costs, and lenders are familiar with energy projects and the ESCos that install them. In addition, most tax-exempt agreements include a "subject to funding" clause that allows the borrower to avoid the capital budgeting process by conditioning the payments on annual funding approval. Most performance contracting projects are financed with tax-exempt lease financing, combined with an energy saving performance guarantee to ensure positive cash flow.

Strengths of Non-Debt Options	Weaknesses of Non-Debt Options
Generally does not require voter approval or constitute debt.	No published market for comparing lease rates.
Risk of ownership stays with lease provider.	The lessee (borrower) usually is not dealing with its primary bank.
Tax benefits are passed on in exchange for a better rate.	Possible repercussions for both the investor and the consumer related to misinterpretation of legal terms and tax code that could result in law suits or disallowance of tax benefits.
Fixed payments, typically not adjustable rates.	Difficulty in getting "apples for apples" comparisons to compare offers.
Flexible terms and payments.	Property owners may not be familiar with operating leases or may not agree with accounting interpretations.
Finance 100 percent of an asset.	
Flexible end-of-term options.	

Service agreements: energy services, shared savings

During the 1980s, shared savings agreements were commonly used to acquire energy efficiency projects. These agreements often were unacceptable, however, particularly to commercial property owners (the ESCos' target market at the time), due to control issues and concerns that the ESCo would reap windfall savings by performing short payback improvements. Consequently, the ESCo industry began to offer a cost plus, fixed-price installation supported by a guarantee of energy savings to ensure that all excess savings would be retained by the owner. However, this business model caused the ESCos to move away from the more comprehensive, higher risk, engineering-intense projects that could achieve high levels of savings and to focus more on low-risk, high-cost installations. During this period, the ESCo target market focus shifted from commercial properties to the government and institutional sector. In this market, the ESCo and its clients sought to increase project size to "spend" all the savings to a break-even cash flow. This allowed the government and institutional customers to maximize the acquisition of capital assets and the ESCo to maximize the

dollar amount of its margins rather than the rate of return (which are achieved under shared savings when estimated levels of savings are exceeded).

Service agreements: energy services, fixed discount to baseline utility costs

This model was introduced to the United States in the mid-1980s by Royal Dutch Shell's ESCo, but it was not generally adopted by other ESCos or the market. A version of this model currently is being reintroduced by Transcend Equity Development Corporation.[22] Under various forms of this model, the property owner agrees to pay the ESCo, rather than the energy utility, an amount equivalent to the full or discounted value of the monthly energy bill. The ESCo pays the utility bill on behalf of the property owner, reduces energy consumption and cost through energy efficiency and retains the difference. This model promotes comprehensive, cost-effective projects because the ESCo retains 100 percent of the excess savings after paying the energy bill. Also, as the energy savings are "monetized" (the actual cash flow available from the property owner is remitted to the ESCo) which reduces investors concerns about the flow of payments.

Strengths	Weaknesses
Non-debt, off-balance-sheet, preserves access to capital.	Owner's concern about windfall profits.
Provides a design-build, turn-key installation.	Owner's concern about losing control of building comfort.
ESCo compensation is tied to energy savings.	Owner concerned about not having a relationship with the contractor that is performing a design-build project (generally requiring a high level of trust).
ESCo is strongly motivated to exceed savings estimates.	
ESCo has incentive to continue to invest in new projects for most of the term of the contract.	
Does not require a guarantee, because payments occur only if there are savings.	

The Financing Gaps: Where Is Financing Inadequate?

This section outlines the shortcomings of the existing financing products and the needs they frequently are unable to meet.

Lack of knowledge of financing options

The primary barrier to adoption of higher levels of energy efficiency by the government and institutional sector is the sector's lack of knowledge and expertise with acquisition and funding options. The options can be classified as either conventional "plan and specification" procurement or design build, energy services/performance contracting. Because government and institutional entities are driven by mission objectives rather than economics, however, they often are not as familiar with procurement and financing options for funding energy efficiency projects. However, the state can take the lead, as other states such as Kansas, Massachusetts and Pennsylvania have done and provide guidance and direct assistance to help evaluate and assist with the procurement of financing options.

[22] Transcend Equity Development Corporation, Dallas, Texas.

Funding for poorly rated or low-rated government and institutional owners

Low or poor ratings increase interest rates or make debt and non-debt financing options unavailable. Most local governments can qualify for financing, but the institutional sector may be more challenged by creditworthiness.

Section 3. Recommendations

General Principles

HB&C recommendations are based on the following principles.

- Capital is a scarce resource. Organizations compete in the capital markets for funds, and departments within organizations compete with each other for funds.
- Increasing a property's energy efficiency generally involves acquiring new technology that, in turn, requires acquisition of capital.
- Many government and institutional property owners find it easier to budget for energy cost than to seek approval for a capital expenditure.
- California cannot achieve its goals without high penetration rates and comprehensive energy efficiency projects in the government and institutional sectors.
- California should provide education, marketing support and technical assistance to grow the market for off-balance-sheet financing contracts that provide minimum savings guarantees and compensation based on measured energy savings.

Recommendation 1. Adoption of the performance contracting, energy services models

California should encourage government and institutional property owners to adopt the performance contracting and energy services business models. Because these models attempt to simplify the acquisition of energy efficiency, they can be funded with off-balance-sheet leases or acquired as a service; they offer low risk to the property owner; and they begin to move the energy efficiency industry away from reliance on subsidies for capital improvements and toward a model under which the ESCo invests and is compensated based on measured savings.

Summary: Establish an education and technical support initiative to encourage at least 50 percent of state and local government property owners to implement performance contracts. The state should provide resources (e.g., advisory body, website, etc.) to assist facility managers with procurement, technical issues, contracts and legal issues and financing options. These resources should also provide case studies of completed projects with contact information so that facility managers could speak with their associates about existing projects such as California Landscape Conservation Cooperative (LCC), California State Association of Counties (CSAC), etc.

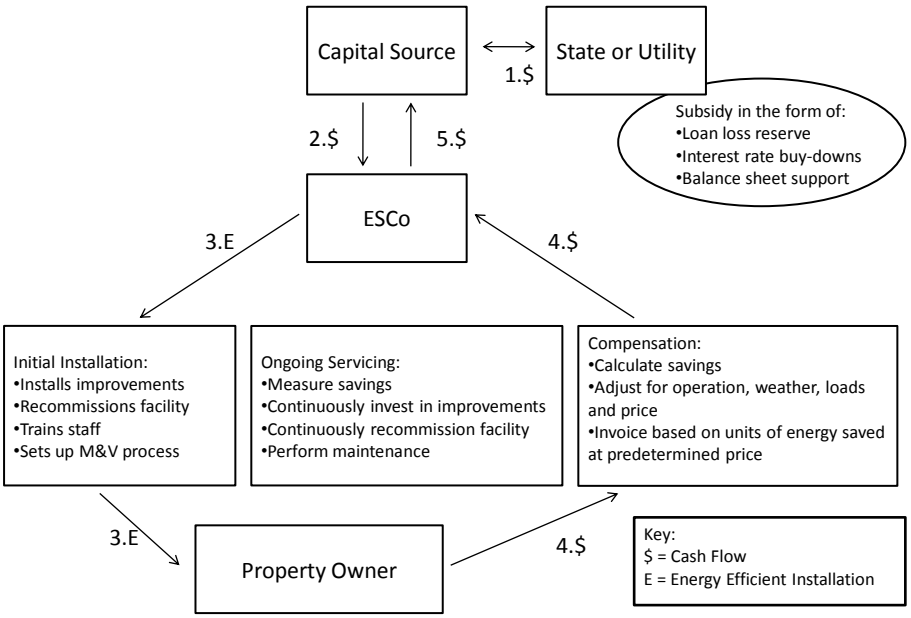
Cost Assessment: The scope of this initiative would include workshops, development of literature and a promotional campaign. Depending on the comprehensiveness of this campaign (direct contact marketing vs. forms of mass marketing), the cost could range from $200,000 to $500,000 over a two-year period. This is a market transformation recommendation, and no direct subsidy is required.

Recommendation 2. Transform the energy services funding model

Summary: California should consider working with the ESCo industry (individual ESCos and the National Association of Energy Service Companies, NAESCo) to provide lower-cost funding for ESCo projects. Although this market has access to low cost tax-exempt municipal lease money, this initiative could explore ways to provide credit enhancements that would make this financing even more attractive. In addition, lessons learned could serve the state when attempting to have a similar impact on the commercial sector.

Cost Assessment: The scope of this initiative would include workshops, development of marketing literature and a promotional campaign. The estimated cost is $400,000 over a three-year period. This market transformation recommendation would require no long-term subsidy. Investors would want to see a commitment of deal volumes and the state of California could be a leader in focusing the energy efficiency industry on cost-effectiveness.

Energy Services with Savings-Based Compensation



1. The State makes credit enhancements (in the form of loan loss reserves, buy-downs, etc.) available to the ESCos' Capital Source.
2. The Capital Source underwrites the ESCos and their individual projects and provides per-project funding. The Capital Source can make both equity investments.
3. ESCo designs, installs, commissions and maintains installation; performs M&V calculations; and generates invoices. The ESCo provides ongoing investment, maintenance and operations assistance to maximize savings.
4. The Property Owner makes payments based on energy savings and remits to the ESCo. The ESCo remits payments to the Capital Source.

Recommendation 3. Tax-exempt lease financing

Summary: California should work with the Equipment Leasing and Finance Association (ELA) and the Municipal Lease Association to create an educational campaign for government and institutional property owners in California. It would be beneficial to include the ESCos and any other energy services providers that offer energy saving guarantees but do not offer financing (which would include almost all ESCos).

Historically, tax-exempt municipal lease financing has been the most common method used by local governments and institutions to fund comprehensive energy efficiency projects. This instrument eliminates the first cost barrier; provides low rates, typically from 4 percent to 6 percent; and the terms (down payments, payment schedules, start dates, progress payments to contractors, maturities, etc.) are flexible. Leases typically fund projects installed by ESCos. The ESCo generally provides an energy saving performance guarantee that ensures positive cash flow (the combination of the energy bill and the lease payment will be less than the pre-installation energy bill).

Cost Assessment: The scope of this initiative would include workshops, development of literature and a promotional campaign. The estimated cost is $200,000 over a two-year period. This is a market transformation recommendation, and no subsidy is required.

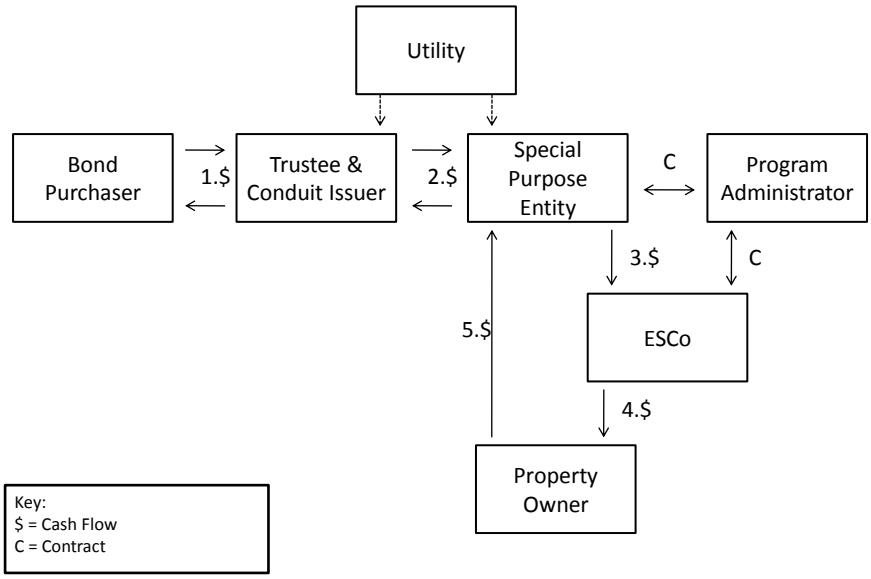
Recommendation 4. Leverage bond financing for ESCos

Summary: California should design a structure to directly fund ESCo projects rather than providing funding to property owners to install projects. Availability of these funds would work to focus the energy services industry on saving energy rather than on selling financed capital improvements.

Under this structure, the state would provide funding directly to ESCos rather than to property owners. Bonds would be issued by a conduit entity, and bond proceeds would be used to fund energy services projects. A "Special Purpose" entity and a program administrator would underwrite individual transactions, manage the ESCos' workflow, fund projects and process payments. The ESCos would provide off-balance-sheet financing to their clients and would be compensated based on energy savings. This program would transfer the obligation for financing to the party that assumes the performance risk (the ESCo) rather than having it flow to the property owner. This change would begin to move the ESCo to the center of the value chain and align its interests with the property owner's interest of reducing energy-related operating costs.

Cost Assessment: The scope of this initiative would include workshops, development of literature and a promotional campaign. The estimated cost is $200,000 over a two-year period. A typical building owner would acquire energy improvements with no collateral and moderate underwriting requirements. The property owner would be required to repay the loan or be subject to service disconnection.

Leveraged Bond Financing for ESCos



1. Bond proceeds flow to Trustee and Conduit.
2. Trustee and Conduit funds Special Purpose Entity. Program Administrator selects and manages ESCos in program.
3. Special Purpose Entity, with approval from Program Manager, funds ESCo on a per-project basis.
4. ESCo designs, installs, commissions and maintains installation; performs M&V calculations; and generates invoices.
5. Property Owner makes payment for energy services to Special Purpose Entity, who remits through Conduit to Bondholders.

Chapter 4. Commercial Sector (including Multifamily Residential and Industrial)

This chapter is divided into three sections: 1) The investment required to meet California's goals; 2) A description of financing products available in California; and 3) Recommendations for enhancing existing or creating new products.

Section 1. The Challenge

This chapter focuses on financing for the commercial market sector: small and large commercial, market rate multi-family and industrial. We chose to combine these four sub-sectors of the commercial market into one chapter because, although the marketing and technical aspects of these sub-sectors vary, we believe that from a financial perspective, they are very similar. In other words, each of these sub-sectors is economically driven with profit/loss and balance sheet limitations.

The Goals

In 2008, the California Public Utilities Commission established ambitious energy efficiency targets for the state's market-rate multifamily, commercial and industrial sectors. The commercial sector goals propose that 50 percent of existing buildings achieve zero net energy use by 2030 through energy efficiency and clean distributed generation. The market-rate multifamily sector goals propose a 15 percent reduction in energy consumption by 2015 and a 40 percent by 2020. Goals for the industrial sector differ from the other market sectors in that they focus on reduce energy cost per dollar of production. These goals, measured both in terms of its size and timeline, are among the most ambitious in the United States. Although California has made steady progress toward improving its energy efficiency across all sectors and ranks 47th among the states in per-capita energy consumption,[23] achieving this goal represents a major challenge.

California's vision for Commercial Energy Efficiency Program (CEEP) for existing commercial buildings, based upon the California Energy Efficiency Strategic Plan of 2008, calls for an integrated set of initiatives that sets out a plan to both overcome market barriers and attain optimal energy management for existing commercial buildings. The Plan recognizes that for California to achieve its goals by the dates specified will require two conditions:

1. The energy efficiency projects must be comprehensive (HVAC, lighting, controls), and
2. The cumulative market penetration rate must approach 50 percent.

The Investment Required to Meet California's Goals

This section attempts to estimate the size of the investment required to meet California's energy efficiency goals and compares that to an estimate of the current level of investment in energy efficiency based on existing utility programs.

The size of the market

For the purposes of this report, the commercial sector is defined as small commercial (less than 150 kW or 30,000 square feet) and large commercial, market-rate multifamily and industrial properties. The small commercial sector represents approximately 3 billion square feet and the large commercial sector represents approximately 2.5 billion square feet.[24] The market-rate multifamily sector, defined as having five or more units, represents approximately 4 billion square feet.[25] Because California's commercial sector, not including market-rate multifamily, represents 6.8 billion square feet (including the industrial sector),[26] if the square footage of the small and large commercial sector is subtracted from this amount, the industrial sector would consist of approximately 1.3 billion square feet.

[23] http://www.eia.gov/state/state_energy_profiles.cfm?sid=CA
[24] www.energy.ca.gov/2006publications/.../CEC-400-2006-005.PDF, and Appendix B
[25] www.dca.ca.gov/cba/publications/stratpln2010-2012.pdf and Appendix B
[26] http://www.next10.org/next10/publications/untapped_potential.html

Typical energy efficiency upgrades and costs

In a non-industrial commercial property, an energy efficiency project can generally be expected to reduce annual energy consumption by 25 percent at a cost of approximately $2.00 per square foot.[27] This investment would create annual energy savings of approximately $23,000 a year, with a simple payback period of 4.5 years.[28]. For example, an HVAC and lighting upgrade in a commercial property of 50,000 square feet would require an investment of approximately $100,000. Achieving similar levels of improved efficiency in California may be more difficult after thirty years of aggressive utility-sponsored energy efficiency programs and the increased use of building equipment codes and standards. California's energy efficiency goals call for 50 percent of existing commercial buildings to achieve zero net energy by 2030. Consequently, if 100 percent of commercial properties were to reduce their energy consumption by 25%, the equivalent amount of energy would be saved.

Energy consumption in industrial properties is driven mostly by the industrial process rather than HVAC and lighting and cannot be characterized with dollar per square foot estimates. A more appropriate measure is energy consumption per dollar value of industrial output, although that measure would only be useful for making comparisons within industries. From an investment standpoint, however, the equipment ownership, balance sheet and credit issues are similar to other commercial enterprises; non-core investment opportunities must meet rigorous hurdles and complete for limited capital.

Based on the preceding numbers, the following table indicates the approximate total investment needed per sector to achieve a 25 percent reduction in the various elements of the commercial sector.[29]

Sector	Multifamily	Small Commercial	Large Commercial	Industrial	Total
Installation Cost	$8,100,000000	$6,000,000,000	$5,000,000,000	$2,000,000,000	$21,100,000,000

During the three-year period from 2010 to 2012, California utilities plan to disburse approximately $500 million in incentives for energy efficiency programs across the commercial market sectors. Because of the variability of DSM programs, it is difficult to determine the leverage ratio this spending will produce, but assuming 1:3 ratio of utility money to property owner funds, it would equate to more than $1 billion invested by property owners. These programs will be delivered through rebates, subsidies and other incentives to support various efficiency programs.

Opportunities and Challenges

This section describes the major opportunities and challenges associated with providing financing to the commercial sector.

The California energy goals were established in light of research that indicates a substantial opportunity exists to avoid the consumption of a unit of energy cost that would be lower than the cost to purchase and consume the unit of energy. This determination is strongly supported by the McKinsey & Company's, Global Energy Report "Unlocking Energy Efficiency in the U.S. Economy," which states that:

> "Energy efficiency offers a vast low cost energy resource for the US economy – but only if the nation can craft a comprehensive and innovative approach to unlock it. Significant barriers will need to be addressed at multiple levels to stimulate demand for energy efficiency and manage its delivery across more than 100 million buildings and literally billions of devices. If executed at scale, a holistic approach

[27] Based on discussions with Trane and Johnson Controls marketing managers
[28] Research interviews with Trane Corporation and Johnson Controls Inc., 2010
[29] Based on HB&C calculation table Appendix B, 2011

would yield gross energy saving worth more than $1.2 trillion, well above the $520 billion needed through 2020 for the upfront investment in efficiency measures."

Assuming a national energy bill of approximately $400 billion,[30] the annual savings of $120 billion represents a savings of 25 percent of the energy consumed by U.S. buildings and a 4.25 year pay back (not including financing charges). In other words, 25 percent of the energy consumed in the United States could have been saved with an investment that would produce a return of almost 25 percent.[31] If the economic opportunity is great and the return on investment relatively high, why does this inefficiency exist? The most likely explanation is that buying energy is simple and convenient: one establishes an account with a utility company, the service is activated and the account is billed monthly. Acquiring energy efficiency, however, is complex and inconvenient: it requires funding a capital expenditure. Therefore, consumers are willing to pay more to purchase energy than to attempt to save energy.

More specifically, why is buying energy efficiency complex and inconvenient? To improve the energy efficiency of its buildings, a property owner must identify the appropriate improvements to install and the operational changes to implement. In the case of the industrial buildings, specialized process expertise, rather than conventional lighting and HVAC expertise, is necessary to obtain optimal results. If the capital assets are purchased directly by the property owner, capital must be acquired, internal or external to the organization. To ensure the return on investment (ROI), energy savings must be measured and actual return calculated. The expertise of engineers and contractors (or an ESCo) is required. Facility operations staff must be trained and managed, and occupants must be informed and possibly asked to participate by modifying their behavior. In other words, achieving high levels of energy efficiency is a substantial undertaking.

Opportunities

Technical opportunity is substantial

Commercial properties are relatively intense energy consumers because they provide HVAC, lighting and plug power, a minimum of 10 hours per day, 52 weeks per year. These facilities have significant heating, ventilation and cooling loads, and the equipment used to serve these loads is complex. This situation generally provides a substantial technical opportunity to achieve savings through re-commissioning, the re-sizing and replacement of equipment and the use of aggressive control strategies.

"Economic" opportunity is substantial

In 2009, McKinsey & Company issued a study, *Unlocking Energy Efficiency in the U.S. Economy*, which indicated that average energy use in buildings could be reduced by 27 percent with a 4.25 year payback.[32] By definition, the commercial sector seeks to reduce costs or increase revenue and they are willing to investment to do so. However commercial enterprises have many opportunities to invest and energy efficiency is not as attractive as options that directly relate to the core business.

Commercial property owners often want to project a green image

The strengthened link between energy consumption and climate change has caused many commercial property owners to work to establish a "green" image by minimizing energy consumption and using other techniques related to managing waste and water consumption. An aggressive, well-publicized energy efficiency and sustainability program can communicate to an organization's customers, shareholders and employees, that the organization is forward-looking and responsible.

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[30] U.S. Energy Information Administration, 2009

[31] McKinsey & Company, *Unlocking Energy Efficiency in the U.S. Economy*, 2009; http://www.mckinsey.com/clientservice/electricpowernaturalgas/us_energy_efficiency/

[32] McKinsey & Company, *Unlocking Energy Efficiency in the U.S. Economy*, 2009; http://www.mckinsey.com/clientservice/electricpowernaturalgas/us_energy_efficiency/.

Challenges

The "market" opportunity is limited

Although the commercial market sector presents an excellent technical and economic opportunity, it is difficult to convince property owners to take action. In other words, the "market" opportunity (as opposed to technical and economic opportunities) is limited, for reasons addressed below.

Use of capital

Capital is a scarce commodity and enterprises compete for it, both in the capital markets (external to the enterprise) and within the organization (internal to the enterprise). Capital is available to enterprises that demonstrate: 1) superior credit performance (e.g., they pay their bills on time) which is a backward-looking evaluation; 2) a compelling business model, which is a forward-looking evaluation; and 3) they are willing to assign collateral to the lender (where lenders can take some type of security interest to protect themselves against the risk of default). Ultimately, capital is made available at rates and amounts that reflect these factors.

Because capital is a scarce commodity within an organization, companies make it available to departments that demonstrate the greatest need. The most compelling requests for capital are related to opportunities for and threats to the organization's core business. Companies prefer to commit capital to initiatives that advance the organization's core business (e.g., building a new manufacturing plant, funding development of a new product, etc.) or that address an issue that prevents an organization from achieving its goals (e.g., complying with regulations, fending off a competitive threat, etc.).

In a study of more than 2,880 executives with budget-level responsibility for their companies, 38 percent indentified limited internal capital, 21 percent indentified insufficient return on investment, and 16 percent identified uncertainty of investment as the leading barriers to implementing energy-saving measures.[33]

Consequently, in most organizations, requests for capital for energy projects do not fare well, as these investments do not address an opportunity or a threat to the core business. In addition, the process of approving a capital expenditure includes an evaluation of return on investment, risks, balance sheet impact and legal issues and can identify numerous concerns (e.g., mortgage covenants that prevent liens, etc.). Energy costs, while significant (typically around $2 per square foot per year) generally represents only 2 percent to 4 percent of a commercial entity's operating budget. A successful energy efficiency project may reduce consumption by 30 percent, that amount improves the bottom line by around 1 percent of the operating budget. After factoring in debt service for a loan to finance the energy efficiency project, the net economic benefit is relatively small.[34] On the other hand, for properties with very narrow profit margins and high energy costs, such as supermarkets, these returns may be material.

Development and implementation of an energy efficiency project

Enterprises that choose to develop energy efficiency projects must evaluate and manage the opportunity from the legal, financial/accounting, engineering and operational perspectives. To access these resources on even an ad hoc basis requires upper management support and availability of an organization's time and resources to perform the due diligence required to make the decision to proceed. A similar cross-organizational team is often necessary to manage the project through completion. Because a comprehensive project will also affect a building's occupied spaces (not only the mechanical rooms and rooftops), it is usually necessary to communicate and coordinate the survey and installation phases with occupants.

Performance risk

Commercial entities make investments, greatly based on expectations of financial performance. Failure to achieve performance goals has numerous negative implications: it may limit budgets for future initiatives and it will require additional time and effort to determine the cause of the shortfall and assign responsibility. Consequently, managing

[33] Johnson Controls and IFMA (2010) Global Energy Efficiency Indicator 2010

[34] ACEEE data on per square foot energy consumption

performance risk is an important element of a successful project. The management process entails frequent measures of energy consumption and calculations of energy savings. In the event that a shortfall is detected, the malfunctions must be found and corrective action taken.

Leased space

Approximately 50 percent of the commercial sector is leased space occupied by tenants.[35] Under the terms of most leases, the tenant pays the energy bill, thereby creating the so-called "split incentive." Tenants are not inclined to fund improvements to their leased space because they often do not know how long they will occupy the property, and they are generally not willing to make improvements that will benefit the property owner. Conversely, property owners are unlikely to fund improvements for which there will be no revenue (avoided energy costs) to cover the cost of their investment. While it is possible to modify the existing lease with so-called "green lease" terms which share energy saving benefits, the parties to a lease are often unwilling to re-open the contract (particularly the party that thinks it has the better contract terms). Also, while reducing operating costs can increase operating income and property value for the owner, if the tenant is paying the energy bills and/or the property owner is not selling the building, the benefits will not be realized. Consequently, for tenant-occupied properties, neither owner nor tenant, has a strong incentive to make a capital investment.

Section 2. Analysis of Existing Financing Products

This section provides the following analysis: 1) a description of existing financing products, their strengths and weaknesses; 2) identification of "gaps" in the ability of these products to serve the market; and 3) a discussion of how to fill the "gaps."

The major sources of funds and financing instruments for the commercial sector are listed below.

3. Debt Options (On-balance-sheet Financing) that include:
    a. Bank loans,
    b. Local governments loans (possibly funded through PACE arrangement),
    c. State government loans funded by bonds, and
    d. Utility loans (possibly collected on-bill).
4. Non-Debt Options (Off-balance-sheet Financing) that include:
    a. Operating lease financing, and
    b. Service Agreements (Energy Services):
        i. Provided by ESCos (shared savings or discounted/fixed energy cost contracts), and
        ii. Provided by utilities (on-bill tariff, funded/owned by utility).

The remainder of this section discusses each of the existing financing options.

Description of Financing Products

Debt options

Debt options are on-balance-sheet obligations that require the property owner to repay a principal amount with fixed or variable interest, typically over a fixed or variable time period.

Bank loans

Large commercial property owners typically have strong banking relationships. If a commercial property owner chooses to accept additional debt, a loan from its primary bank can be a good source of funds. Depending on the quality of the banking relationship, the entity's bank is likely to know its client's balance sheet and overall creditworthiness, which makes underwriting a loan relatively quick and inexpensive. To better serve the commercial market sector with bank

[35] Based on Johnson Controls survey of commercial properties, 2009

loan financing, it would be important to evaluate ways to increase banks' profitability for these loan or reduce lenders' risks. The typical barriers to the use of bank loans include the following.

- Loans made solely for energy efficiency are often for amounts less than the banks acceptable minimum loan size. Many lenders are reluctant to make loans of $30,000 to$150,000, which is cost of many efficiency retrofit projects. Each loan must be separately underwritten and serviced, so economies of scale are limited.

- Availability of credit is often limited for the small commercial sector; even if a bank is willing to make the loan by requesting security, the loan term often is short and the interest rate is high. Lenders often require a personal guarantee from property owners for small commercial borrowers. Small commercial properties generally are held for longer periods than large commercial properties, because their investors tend to take a buy and hold approach.

- Existing senior mortgage lien holders often have loan covenants that require a borrower to seek approval before making changes to attached fixtures in a building or assuming additional debts and liens. As a result, it can be challenging to bring a new lender into the existing financial structure of a commercial property.

Loans backed by property assessments (PACE)

The concept for Property Assessed Clean Energy (PACE) funding, developed during the last few years, is being implemented in numerous jurisdictions. PACE relies on a land-secured financing district structure used historically to fund water, sewer and other infrastructure projects (and recently, open space purchases). PACE-secured loans are enabled by local governments that have authority to assess property taxes. PACE can be used to provide security to municipalities, direct lenders or bondholders. Should PACE become more widely available in the commercial sector, it would offer a substantial opportunity for long-term, secured and low-cost financing for efficiency measures.

In 2010, however, the Office of the Comptroller of the Currency (OCC) voiced concern about the PACE model and cautioned lenders about accepting this form of security for the non-residential sector.[36] It is unclear whether PACE will remain a viable option for this market sector, although commercial programs are moving forward in some jurisdictions nonetheless.

Loans funded by bonds

State and local governments can issue general obligation, revenue or special purpose subsidy bonds such as Qualified Energy Conservation Bonds (QECBs) to provide funds for the commercial market sector. Although these funds are more likely to be a source of capital for public sector initiatives, they could be used to fund the commercial sector. In most cases, the government is obligated to repay bond holders resulting in very low interest rates available to commercial borrowers. This risk of property owners not repaying the government can be mitigated with rigorous underwriting, loan servicing, loan loss reserves or third-party credit insurance. (This option is discussed below in greater detail.)

Loans funded by utilities, with or without on-bill collection

Commercial property owners in general and small commercial property owners in particular, indicate that a low-interest rate loan provided by their utility company, particularly an unsecured loan with payment on the utility bill, is a very attractive option. Furthermore, a service shut-off option could be effective at reducing defaults in lieu of security.

The California investor-owned utilities have launched on-bill initiatives for various market sectors and, by most accounts, the programs have successfully stimulated efficiency projects. Such programs have been particularly popular with owners and contractors in the small commercial sector.

Although utility financing can be a very effective form of financing, utilities face numerous issues related to funding, billing, servicing and collections. For instance:

[36] Office of Comptroller of the Currency (OCC) Supervisory Guidance, Document Code 2010-25; July 6, 2010

- If these programs continue to grow in volume, at some point a decision will be necessary about whether the source of funds will be ratepayers, shareholders or third parties.
- Utilities typically have a 50 percent-50 percent debt to equity ratio, while lenders are more likely to have a 90 percent -10 percent, debt to equity ratio. Therefore, utilities cannot hold large volumes of low-return loans on balance sheets without driving down their return on equity.
- If banking regulators determine that funds provided to customers constitute a loan, rather than a service, the utility must comply with numerous state and federal regulations unless they are granted waivers.
- On-bill collections frequently require major changes to IT systems and invoices.
- Protocols must be established to establish priority of payment (when the customer payment is less than the invoice amount).
- In cases where third-party capital is used to fund a loan, utilities need clarification as to whether or if a service disconnection is allowed in the case of non-payment of the loan.

Strengths and weaknesses of debt financing (on-balance sheet) for the energy user

Strengths	Weaknesses
Commercial property owners are familiar with loans and the origination process.	Most property owners have to satisfy a lengthy capital expenditure process to acquire debt.
Loans can be structured with a wide range of rates and terms.	Property owners may not qualify for additional debt, the covenants of many commercial loans requires approval to add new debt.
The loan origination process is not overly expensive.	Additional debt and assets affect the borrower's balance sheet, return on equity and various financial metrics.
The tax implications of loans are well understood.	Borrowers must pay debt service, even if savings are not achieved.
Many commercial lenders are interested in making loans.	A 30% tax credit is available for renewable energy projects but not for energy efficiency; therefore, energy efficiency is disadvantaged as an investment.

Non-debt options (off-balance-sheet leases and service agreements)

Commercial lease financing

Commercial lease financing, the most common method used by the commercial sector to acquire equipment, is a viable instrument for financing energy improvement. The commercial lease occupies a middle ground between loans that are on the balance sheet and service agreements that, like electric utility service, are not. The two major lease forms are operating and capital. Because capital leases do not remove the asset from the lessee's balance sheet, they are similar to loans and will not be discussed here in depth.

Under an operating lease, the title to the equipment is held by the lessor (the entity providing the lease). The lessee typically can acquire ownership at fair market value at contract termination or can take advantage of other options specified in the lease agreement. Under a capital lease, the owner acquires title to the equipment at contract signing. Lease users generally are categorized as taxable and non-taxable (governments and nonprofits such as 501(c) 3 organizations, C Corporations and S Corporations. The source of funds for leasing is varied, and can include banks, capital funds and individual investors. Each investor determines how legal and accounting standards should be applied. However upcoming developments in accounting standards may move U.S. regulations toward what is referred to as

"convergence" with their European counterparts relative to leasing. This shift could cause major changes in lease accounting during the next few years and eliminate its off-balance sheet benefit.

Strengths and weaknesses of off-balance sheet, lease financing

Strengths	Weaknesses
Non-debt, off-balance-sheet preserves access to capital.	No published market exists for comparing lease rates.
Risk of ownership remains with lease provider.	The lessee (borrower) usually is not dealing with its primary bank, which knows the borrower's credit worthiness, and the lessor (provider) must re-underwrite the potential lessee. The lessor cannot be expected to understand the creditworthiness of the borrower as fully as its core bank.
Lessee can pass on tax benefits in exchange for better rate.	Possible repercussions are related to aggressive interpretation of legal terms and tax code.
Converts a capital expenditure to a tax deductible operating expense.	Difficulty comparing offers on "apples for apples" basis.
Flexibility of terms and payments.	Property owners may not be familiar with operating leases or may not agree with accounting interpretations.
Can finance 100 percent of an asset.	
With end-of-term flexibility, lease provider takes equipment at end of term or lessee buys it at market value.	
Fixed payments and typically not adjustable rates.	

Service agreements –Energy Services provided by ESCos

Energy services should generally be viewed as a business model rather than a form of financing. When the energy services business model was introduced to the United States in the 1980s, ESCos were frequently paid based on actual, "measured at the meter", energy savings (either with a share of the savings or by a payment equal to a percent of the historic energy bill; under such an agreement the ESCo would reduce consumption with energy efficiency measures and retain the excess amount after paying the actual energy costs). Consequently, energy efficiency projects represented an investment by the ESCo, not the property owner.

Over the last 20 years, the ESCo industry shifted its business model from "energy services" (described above) to "performance contracting." This came about because most ESCos had their own balance sheet limitations and could not to take on new projects indefinitely. In addition to the skepticism about this new business model (particularly the possibility of wind-fall savings for the ESCo), the early adopters this service, generally governments, preferred a fixed payment to the ESCo. Under the original "energy services" business model, the ESCo sought to minimize capital investment and maximize savings revenue through the application of high-quality engineering and operational improvements, as well as capital improvements. Whereas performance contracting uses the implied energy savings cash flow and savings guarantee to support a major capital project for the property. The performance contractor is generally paid based on the value of the capital acquisition and its profits are linked to the size of the expenditure, rather than energy savings. As the ESCo industry became more familiar with the government sector, it found that this sector had relatively easy access to low-cost capital via tax-exempt municipal lease financing or bonds. The

developments changed the industry from a focus on energy savings to a focus on capital improvements and project size, where it remains today.

The two basic "true" energy services forms of compensation are shared savings (similar to a power purchase agreement) and arrangements that offer fixed or discounted energy costs to the client. Under a shared savings contract, measurements and calculations determine the quantity of energy units saved and the property owner and the ESCo or financing company share the value of the energy savings based on a previously agreed-upon formula. If the scope of installation is limited to short paybacks (less than three years, for example) the share may be 50/50. If, on the other hand, the project is comprehensive and includes longer paybacks, the share may be 90/10, with the ESCo receiving the dominant share. The more comprehensive project will be attractive to an owner that seeks to acquire major capital improvements.

Under the fixed or discounted energy cost contract, the ESCo establishes a baseline annual energy cost for the property owner's facility and pays the utility bill going forward. In return, the owner agrees to compensate the ESCo with a fixed amount (with adjustments for weather and other loads). The ESCo installs energy efficiency improvements that reduce the actual energy costs the property owner pays the ESCo the fixed or discounted monthly payment, and the ESCo pays the utility, retaining any differential as revenue. This contract type was introduced in the United States in the 1980s but was not considered a compelling value proposition. However the commercial markets are now being offered a version of this model by Transcend Equity Development.

Strengths and weaknesses of off-balance-sheet service agreements

Strengths	Weaknesses
Non-debt, off-balance-sheet preserves access to capital.	Owner concerned about excess profits because ESCo is paid based on energy savings. This issue can be mitigated by including a cap on energy savings payout and through education showing statistical results of existing projects.
Provides a design-build, "turn-key" installation.	Owner concerned about losing control of building comfort. This issue can be addressed in the contract with comfort and scheduling parameters.
ESCo compensation is tied to energy saved.	Owner concerned about not having a relationship with a contractor that offers a design-build project.
ESCo is motivated to exceed savings estimates.	
Does not require a guarantee from ESCo.	

Energy services provided by utilities

With regulatory approval, utilities could use the on-bill financing structure to provide energy services to their commercial customers. Under such an arrangement, the utility would install the improvements, funded by shareholders, ratepayers or third-party investors and charge the customer a tariff-based service fee. The service fee would decline in annual increments, eventually reaching zero, but would remain on the bill for the new occupant to pay if the property were sold prior to the end of the contract term.

The Financing Gaps: Where Is Financing Inadequate and How Can these Shortcomings Be Addressed?

This section outlines the shortcomings of the existing financing products and the needs they frequently are unable to meet.

Property owners do not want to add assets and liabilities to the balance sheet

As described previously above, commercial property owners prefer to use debt to address opportunities and threats to the core business.

Property owners may not meet underwriting requirements

Without assets that can be easily converted to cash (liquid collateral), lenders must perform a detailed underwriting of the borrower to establish willingness and ability to pay. The risk of nonpayment to the investor could be reduced with a performance guarantee issued in standard form (a national standard energy savings guarantee has yet to be accepted by investors) or the ESCo or a third-party could assume payment of the energy bill. To the extent that the predicted level of energy savings is achieved and if unit prices do not rise, this approach would monetize (make available as cash) the energy savings. Many prospective borrowers will not score high enough in this evaluation to qualify for financing.

Property owners often will not fund paybacks longer than one or two years

Property owners are willing to invest in four- to six-year paybacks in their core business, but they are unwilling to tie up capital and accept risks in relatively small, unfamiliar, non-core investment opportunities such as energy efficiency. The most obvious solution to this issue is to offer energy efficiency as a service (if the energy users pay, for example, $.12 for a kWh, they should be willing to purchase a saved kWh at any price less than that, if no investment is required).

Property owners own the energy assets, but tenants typically pay the energy operating costs (the so-called "split incentive")

Building owners are reluctant to make an investment to reduce their own energy bill, but are even more reluctant to make an investment to reduce their tenants' energy bill. On the other hand if the property owner/investor is reasonably assured of an increase in net operating income as a result of the ability to increase rents, such an investment becomes more attractive; property owners only rarely feel that level of reasonable assurance and therefore are typically reluctant to make capital improvements to buildings for which they do not pay the utility bill.

Property owners are reluctant to participate in what they believe to be new and untested business models such as energy services

Neither performance contracting, which offers a guarantee of savings, or true "energy services," under which the ESCo is paid based on the units of energy saved, has achieved meaningful penetration in the commercial sector. Commercial property owners often are not willing to spend the time and effort to understand and take risk by participating in someone else's innovative business model unless there are strong incentives. However, owners should be willing to participate in a version of energy service agreement (true energy services) that can be passed on to the tenant as an operating cost if it enhances a building's assets and operation.

Section 3. Recommendations

General Principles

The recommendations in this section are based on the following basic principles.

- Capital is a scarce resource. Organizations compete in capital markets for funds, and departments within organizations compete with each other.
- Increasing a property's energy efficiency generally involves acquiring new technology that, in turn, requires acquisition of capital.
- Most commercial enterprises limit capital acquisition to opportunities or threats related to their core business; they are much less interested in funding fractional reductions in operating costs.
- Even if a commercial property owner chooses to pursue energy efficiency, many have neither the inclination nor the financial strength to assume debt for energy efficiency projects.
- Commercial property owners could offer property liens as security, but existing lien holders frequently do not allow this.
- Financing energy efficiency primarily with on-balance-sheet debt will have very limited success.
- California cannot achieve its goals unless a large portion of the commercial sector implements comprehensive energy efficiency projects.

- California should consider a three-phase strategy for the commercial sector:
    - Phase I, near-term, Debt Financing: Enlist the financial community's support to adopt standard savings guarantees, sources of commercial credit risk insurance, interruption of payments insurance and standard debt agreements for financing energy efficiency improvements. Work with commercial lenders to identify other necessary forms of support.
    - Phase II mid-term, Lease Financing: Transition the market from relying on debt financing to off-balance sheet forms of lease financing. Explore the opportunity for an IOU to offer a master lease financing initiative with on-bill payment and shut-off authority (replacing the real estate lien as security).
    - Phase III long-term, Service Agreements: Transform the existing energy services business model that compensates an ESCo based on project cost to one that compensates the ESCo based on actual energy saved. This change would eliminate the need for financing for property owners, energy saving guarantees and, eventually, utility/government subsidies. Launch this initiative by creating an ESCo industry group to work with a building owner group (BOMA) to adopt a standard contract for this service.

Financing Recommendations

Recommendation 1. Bank loans

Summary: California should work with commercial banks to design a revolving energy efficiency loan fund and to determine if an interest rate subsidy or a credit enhancement (possibly a 10 percent loan loss reserve but this estimate will vary by bank and by underwriting) is needed to build volume. Participating lenders would underwrite, originate and service loans and access the program for buy-downs and loss recovery.

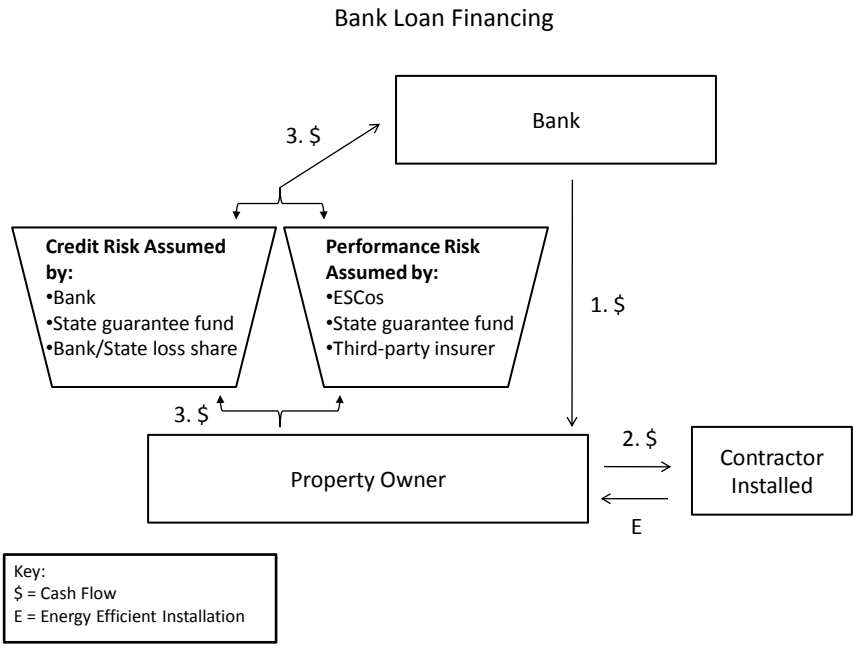
For some commercial property owners, bank loans will be an acceptable way to acquire energy-efficiency projects. To make this market sector more attractive to lenders, they must have discretion in pricing loans and the opportunity to cross-sell other products/services to borrowers. Lenders will also prefer to participate in programs that reduce their loan loss risk with credit enhancements, have strong balance sheet companies (such as ESCos) assume the energy saving performance risk, allow property liens or other forms of collateral, use standardize loan terms, limit the number of participating lenders, and provide support for lower capital requirements. It might be possible to include utility shut-off provisions that would provide lenders with a low cost form of security.

Cost Assessment: The scope of this initiative includes marketing to identify interested parties, workshops to evaluate options and a program development effort to establish and fund accounts. The estimated cost to administer such a pilot program is $200,000 over a two-year period, not including the cost buy-downs or loan loss reserves. The evaluation would attempt to determine the cost-effectiveness of buy-downs and loan loss reserves. The typical cost for an interest rate buy-down is often 3 percent of the loan dollar amount for each 1 percent reduction in the interest rate.

	Cost of Interest Rate Buy-down	**Cost of Loan Loss Reserve**	**Funds Available to Lend**
	From 8% to 6% = 2% 2% at 3% (cost per point) = 6%	10% of reduced pool amount ($9,400,000)	
$10,000,000	$600,000	$940,000	$8,460,000

HB&C predicts the total capital need for all commercial sectors (multifamily, small and large commercial and industrial) to be approximately $2 billion per year. A 10 percent loan loss reserve would cost the state approximately $200 million

per year, which may not be an affordable subsidy and which supports the case for a long-term, non-debt solution for this market.



1. The Bank underwrites and funds property owner.
2. The Property Owner selects a contractor, negotiates a contract and funds the contractor's installation.
3. The Property Owner repays bank principal in interest, over time.

In the base example, the property owner is taking the energy savings performance risk, and the bank is taking the risk of default by the property owner. As indicated in the flow chart, these risks could be assumed by other parties such as ESCos, the state, credit insurers, etc.

Recommendation 2. On-bill master lease financing provided by utilities

Summary: California should direct IOUs to work with the leasing industry to explore the development of a master lease program.[37] Under this arrangement, utilities would draw down funds as an off-balance sheet master lease line of credit and provide off-balance sheet sub-leases to its credit worthy customers. This source of funds could provide a low interest rate to utility customers, as it is based on the utility's credit worthiness rather than that of the utilities' customers. If this model is successful in generating large volumes of sub-leases, they could be securitized and sold into the capital markets.

The utility would rely on a program administrator to underwrite the applicants for the sub-leases and credit information sources such as Dun & Bradstreet ratings, PAYDEX® Score, years in business, credit scores, would be considered. An underwriting standard and pricing grid would be created for each of four credit tiers (listed below), such as:

1. Companies that are rated by one of the major rating agencies;
2. Companies that are listed on the NYSE, NASDAQ, etc.;
3. Companies that are not listed or rated but that can provide three years of audited financials and other underwriting documentation; and

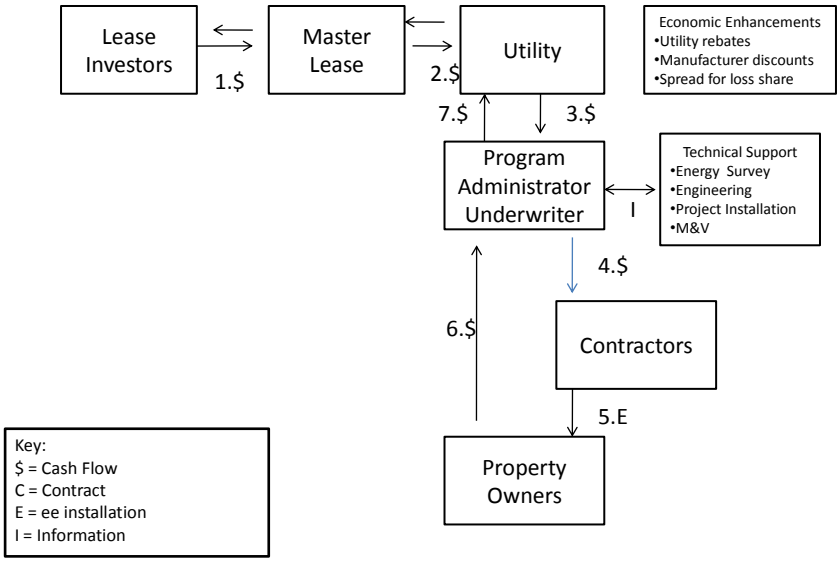
[37] Renewable Energy Equipment Leasing (REEL) has created similar programs, 2011

4. All companies that must be underwritten solely to the owner's personal credit, which could include utility payment history.

The utilities would be obligated to provide a full faith and credit guarantee for the line of credit, but losses would be supported by a loss reserve funded by a percentage of the interest rate. To determine this amount of this reserve, estimates for each credit tier would be developed by the program administrator and underwriter, and overall loss estimates would be extrapolated based on loan volumes in each credit tier and shared with the IOU for approval. The utility could collect payments on-bill, with tariff status, and use "shut-off" authority to further improve credit performance. Because the utility company is the master lessor, the rate on the master lease would be low, reflecting its credit rating and this low rate could be passed on to the utilities' customers. These elements would create a program that could serve a large volume of customers with below-market interest rates and high levels of approval. Shut-off for non-payment would ideally be incorporated into this structure; the Commission would need to determine (for IOUs) that money that utilities borrow through a master lease is utility funds, since utilities would be fully liable for credit losses on these funds. This determination would give the sub-leases the same status as other the current on-bill finance programs that use utility money and that are tied to utility service disconnection for failure to pay.

Cost Assessment: The scope of this initiative would include workshops with IOUs and the leasing industry to determine the feasibility of this model. The cost of this effort would be limited to a financial advisor for approximately a two-year period.

Commercial Sector : Master Lease Utility Program



1. Lease investors fund master lease line of credit for the Utility.
2. Program Administrator underwrites the individual applications and makes recommendations to the Utility.
3. If the Utility approves the application and agrees to fund the project, it provides funds to the Program Administrator.
4. The Program Administrator signs contracts with the Contractor and Property Owner, agrees to an installation schedule and progress payments, and funds the project.
5. The Contractor installs the project, and the Property Owner signs a completion certificate.
6. The Property Owner makes lease payments, either responding to on-bill invoices or not, to a lockbox, and the payments are collected and processed by the Program Administrator and the Utility.
7. Payments are divided into servicing, loss share, and principal and interest, remaining principal and interest payments are remitted to investors.

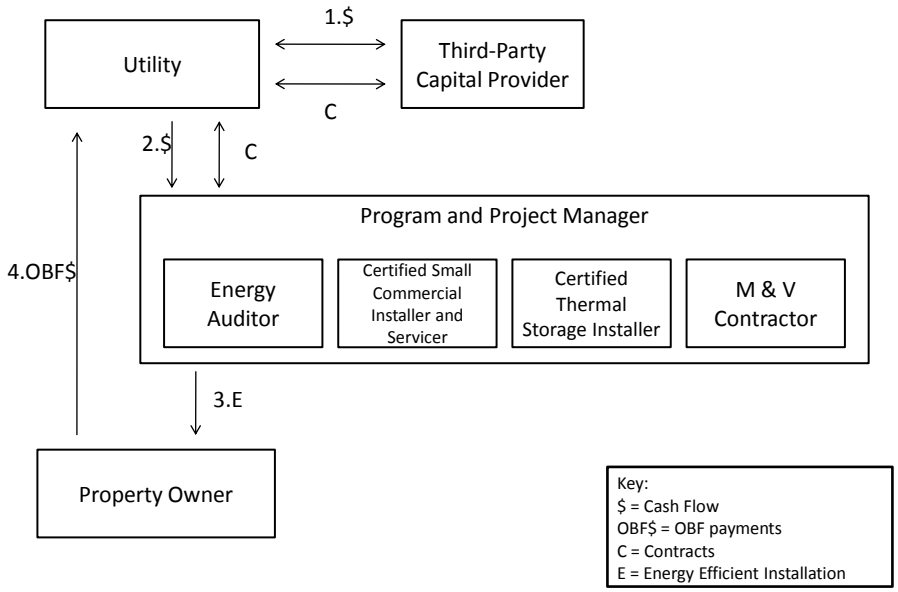
Recommendation 3. Small commercial market sector variation: on-bill for thermal storage plus comprehensive energy efficiency

Summary: Using the thermal storage program as a foundation, include a comprehensive energy efficiency makeover for small commercial properties. The program would require a detailed energy survey to identify measures that would be installed with the thermal storage. The program would attempt to use the property owner's contractors and train them to operate and maintain the thermal (ice) storage system. The thermal storage system would be provided by the utility, and financing for other measures would be provided under the utility's on-bill financing program.

California utilities have been offering a thermal (ice) storage program for small commercial properties. This could present an opportunity to create a more comprehensive program that would benefit from simultaneously performing the two installations (energy efficiency and thermal storage). The capital investment for the energy efficiency portion could be funded under the municipal master lease program (the thermal storage systems are funded by the utility) and be repaid with on-bill financing. The program could use the property owner's mechanical contractor as the general contractor to reduce marketing costs, integrate the thermal storage technology into the facility's systems, and have the owner's contractor assume maintenance on all equipment.

Cost Assessment: The scope of this initiative would include workshops, development of literature and a promotional campaign. The estimated cost is approximately $400,000 over a three-year period.

Small Commercial OBF EE Plus Thermal Storage



1. Capital flows from Utility (shareholders or ratepayers), but as volume increases, Utility could use the master lease, off-balance-sheet funding structure.
2. The Utility and Program Manager review application from Property Owner and make a decision based on underwriting standards. The Utility funds the Program Manager. The Program Manager works with the Property Owner to select contractors.
3. The Contractors install equipment in Owner's property and receive payment from the Program Manager.
4. The Owner makes on-bill payments, and the Utility retains or remits payments to third-party provider, depending on the source of funds.

Recommendation 4. Direct commercial lease financing

Summary: The IOUs should work with the Equipment Leasing and Finance Association (ELA) and the Municipal Lease Association to create an educational campaign for California property owners. It would be beneficial to include the

ESCos and any other energy services providers that offer energy saving guarantees but do not offer financing (this would include almost all ESCos).

As noted in the previous section, leasing can allow property owners to perform energy efficiency projects off-balance-sheet under current accounting rules, and eliminate the first cost barrier to procuring energy efficiency. If California chooses to not pursue master lease financing, it may be beneficial to promote lease financing directly to property owners with no utility involvement.

Cost Assessment: The scope of this initiative would include workshops, development of literature and a promotional campaign. The estimated cost is $200,000 over a two-year period. This is a market transformation recommendation, and no subsidy is required.

Recommendation 5. Leverage bond financing for ESCos

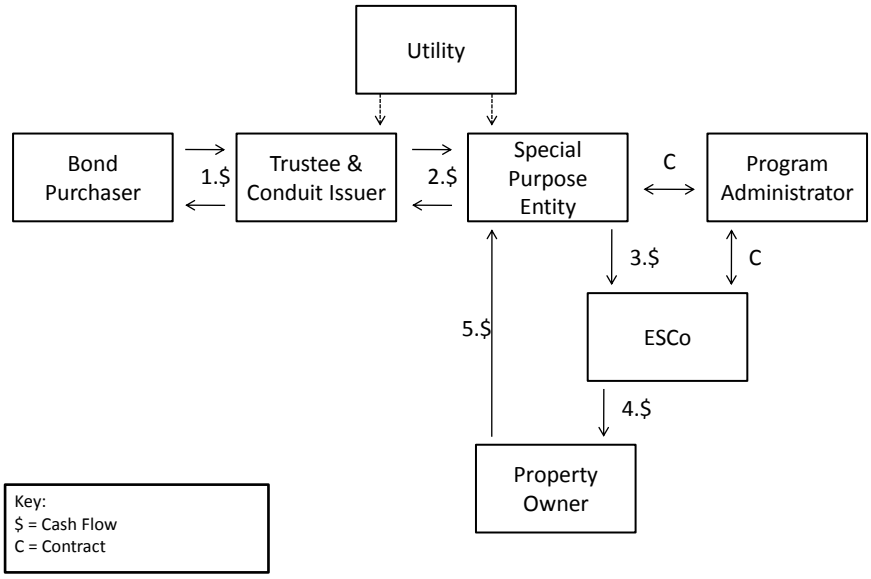
Summary: The CPUC should work with a program administrator to design a structure to directly fund ESCos rather than property owners. Availability of these funds would help refocus the energy services industry from capital investment to energy savings.

HB&C proposes that California explore the opportunity to reintroduce the original energy services business model to the commercial sector which provides off-balance-sheet financing and compensates the ESCo based on energy saved. If this model can build volume, the focus of the capital markets will shift from financing projects for property owners to financing equity and debt for ESCos.

Under the model presented below, bonds are issued by a conduit issuer, possibly with the backing of a utility company and the proceeds are used to fund ESCos' energy services projects. A special purpose entity working with a program administrator would manage the ESCos' workflow and underwrite the individual transactions. The ESCos would offer their clients efficiency as a service (off-balance-sheet) and be compensated based on energy savings. This program would move the performance risk to the ESCo, and the property owner's credit risk to special purpose entity/conduit issuer. It also would begin to move the ESCo to the center of the value chain, away from its perceived role as an interchangeable contractor.

Cost Assessment: The scope of this initiative would include workshops, development of literature and a promotional campaign. The estimated cost is $200,000 over a two-year period. A typical building owner would acquire low interest rate funds with no collateral and moderate underwriting requirements. The property owner would be required to repay the loan or be subject to service disconnect. The interest rates for this program could be reduced by establishing a loan loss reserve or by buying down the rate with rebate or other funding sources. The cost to buy down the interest rate, for example, would be approximately 3 percent of the lease dollar amount for each 1 percent reduction in the interest rate.

Leveraged Bond Financing for ESCos



1. Bond proceeds flow to Trustee and Conduit.
2. Trustee and Conduit fund Special Purpose Entity. Program Administrator selects and manages ESCos in program.
3. Special Purpose Entity, with approval from Program Manager, funds ESCo on a per-project basis.
4. ESCo designs, installs, commissions and maintains installation, performs M&V calculations, and generates invoices.
5. Property Owner pays Special Purpose Entity, which remits through Conduit to Bondholders.

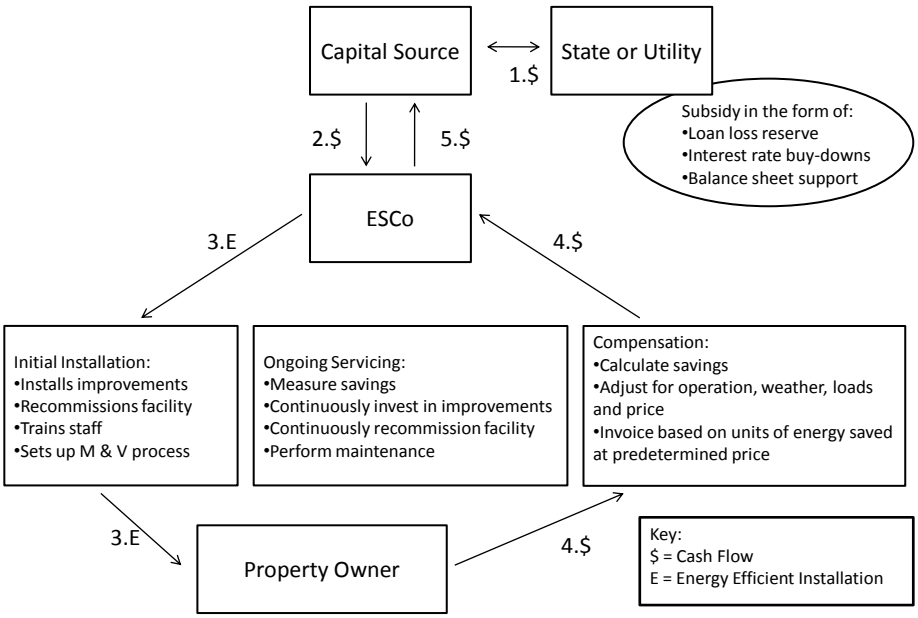
Recommendation 6. Transformation of the energy services business model

Summary: California should consider working with the ESCos industry (individual ESCos and the National Association of Energy Service Companies, NAESCo) to promote reinstatement of energy services as a true service. Under this arrangement there would be no balance sheet impact to the property owner and the provider (the ESCo) is compensated based primarily on energy savings. This shift would make acquisition of energy efficiency equivalent to that of acquiring energy, a service contract.

The primary barriers to adoption of energy efficiency by the commercial sector are the sector's reluctance to use capital for non-core business projects and the typically short time horizons for non-core projects. In addition, many commercial enterprises are unwilling to undergo the development process to acquire a major energy efficiency project. To address these barriers, when energy prices first began to rise in the 1980s, the market responded by creating the energy service business model, which provides a turn-key approach; does not place the investment on the property owners balance sheet; and compensates the provider (the ESCo), based on energy savings. During the last decade, however, the energy services business model has given way to the performance contracting model. The ESCo industry focused instead on providing capital improvements to the capital-deficient public sector, which could be paid for with reductions to the energy bill. In addition, the ESCos' compensation, which initially was savings-based, shifted to cost-plus, which provides an incentive for the largest project size rather than the greatest energy cost reduction.

Cost Assessment: The scope of this initiative would include workshops, development of literature and a promotional campaign. The estimated cost is $400,000 over a three-year period. This is a market transformation recommendation, and no long-term subsidy would be required.

Energy Services with Savings Based Compensation



1. Optionally, the state or utility could make credit enhancements or interest buy-downs available to the ESCos' source of capital.
2. The Capital Source underwrites the ESCos and their individual projects and provides funding on a per-project basis. The Capital Source can make both equity and debt investments.
3. The ESCo designs, installs, commissions and maintains the installation, performs M&V calculations, bills the client and provides ongoing investment, maintenance and operations assistance to maximize savings.
4. The Property Owner remits payments to the ESCo (based on energy savings).
5. The ESCo remits payments to the Capital Source.

Chapter 5. Conclusions and Recommendations

Overview

Achieving California's energy goals will require an estimated capital investment of approximately $5 billion per year.[38] Demand-side management spending by California utilities is approximately $1 billion per year.[39] The ESCo industry installs $4 billion of energy efficiency projects annually[40] in the United States, and we extrapolate that amount spent in California to be approximately $500 million. Property owners also install energy improvements without the assistance of ESCos and contribute matching funds for demand-side management projects, but the data to establish dollar amounts was not available for this report. In sum, it is reasonable to assume that total energy efficiency spending in California is approximately $2 billion per year. Consequently, a substantial additional investment is required for California to achieve its energy efficiency goals. While this calculation includes numerous assumptions, it is clear that the magnitude of the investment required to meet California's efficiency goals is beyond current levels of investment.

Conclusions

Residential single family sector

HB&C believes that the unique single family residential market sector could be treated independent of the other sectors. Financing in this sector is needed to replace failed equipment, fund whole-house improvements, and purchase energy efficient homes. The first need, replacing failed equipment, is best served by a point of sale, low interest rate, unsecured loan, which is available in many forms. By focusing on standardization, building loan volume to allow securitization, and improving loan loss performance, interest rates can be reduced.

The other major use of funds in the single family residential sector is for whole-house retrofits. Because this is a low-volume market, the lack of projects makes it difficult to raise interest in a new financing product. Timing is good, however, because the FHA is launching a new version of the Title 1 loan, referred to as the PowerSaver. This product, an unsecured loan of up to $7,500 and secured up to $25,000 (typically a second lien), allows terms of up to 20 years. The CPUC should direct the IOUs to create programs to promote and possibly subsidize, whole-house work funded by the PowerSaver.

The home finance industry offers numerous versions of the energy efficient mortgage to: 1) prospective borrowers who are purchasing a new or existing home that currently is efficient or they wish to make efficient, or 2) homeowners who want to refinance to pay for energy efficient improvements. As with the whole-house improvement market (described above), the energy efficient mortgage has never generated sufficient volume to gain investor interest. There are two ways to address the lack of volume:

1. Increase the number of so-called EEM "facilitators" who act as middlemen between the borrower, lender and contractor. This model has raised concerns because the contractor typically pays the facilitator and questions exist about the lack of independence for purposes of obtaining competitive bids.
2. Continue to encourage and incentivize lenders and realtors to market the EEM to home buyers and home refinancers. This has not been done in the past because it is seen as slowing down the process and it does not generate revenue.

[38] See table appendix C
[39] See PUC evaluation need more information
[40] NAESCO, ESCo Market Study, Charles Goldman LBL, 2008

Government, Institutional and Commercial sectors

Although the government and institutional sectors are distinct in many ways, HB&C believes they are similar to one another relative to energy efficiency financing. Both can use low-cost, tax-exempt municipal funding to finance energy improvements but neither considers it a top priority because acquiring funds, designing and procuring the improvements and assuming the risk of achieving the projected energy savings presents barriers to proceeding.

Government and Institutional sector recommendations

The government and institutional sectors include state and local governments and all nonprofit organizations. HB&C recommendations include the following:

Recommendations 1 and 3: Adopt the performance contracting business model and use tax-exempt municipal lease financing

Performance contracting is the most common method state and local governments and institutions use to acquire energy efficiency projects. These entities use tax-exempt municipal lease financing as a source of funds and receive an energy saving guarantee from the performance contractor (often referred to as an ESCo). This method is effective, and the CPUC should consider education and technical support programs to increase the up-take of these projects.

Recommendation 2: Transform the performance contracting business model to energy services

The goal of promoting energy efficiency is to reduce consumption, not simply to fund capital projects. Therefore, the California should consider working with the performance contracting business community and recent innovators of new compensation models to promote energy savings-based compensation. Providing capital directly to ESCos would be a major step toward making acquisition of energy efficiency less difficult for property owners.

Recommendation 4: Leverage bond financing for ESCos

Property owners consider acquisition of financing a major barrier to adoption of energy efficiency. The CPUC should consider structures that make capital available to ESCos. The state could/should use a bond financing mechanism to make low-cost capital available directly to ESCos.

Commercial sector recommendations

The commercial sector includes small commercial, large commercial, market-rate multifamily housing and industrial properties. Recommendations include the following. Therefore, in the long-run, energy efficiency should be offered as a service rather than as a capital investment. Although HB&C recommends various enhancements to debt-funding options and proposes a major initiative to promote off-balance-sheet leasing, the CPUC should support recent innovations that allow energy efficiency to compete head-to-head over the long-term with its alternative—energy consumption—and be sold as a service.

Recommendation 1: Optimize bank lending (debt) for energy efficiency

In the commercial sector, banks are probably the most common source of funding for the relatively modest levels of energy efficiency installed by property owners. Banks have generally approached energy efficiency financing individually. However, with some level of state assistance, it may be possible for banks to approach this opportunity as a group. Lenders tell us that many of the entities in this sector will not or cannot add debt to the balance sheet, but it is possible that a statewide program offering credit enhancements, collateral, fees and risk could overcome these concerns.

Recommendations 2, 3 and 4: Utility-sponsored master lease financing with on-bill collection or direct leases

Under these arrangements, the utility would take a master lease line of credit and make low-cost, off-balance-sheet funds available to customers/property owners who perform energy efficiency improvements. The utility also could collect payments on the utility bill, with a "tariff" status that allows service disconnection for nonpayment. This would further reduce potential losses and, therefore, the interest rate. The master lease providers would address issues related to interruption of payment such as sale or refinance of the property. Such issues generally are negotiable but may affect the interest rate.

A variation on this initiative could combine it with the existing small commercial thermal storage program and require the property owner to perform a comprehensive energy efficiency project with the thermal storage system by taking advantage of the more economical practice of having both technologies installed simultaneously.

Finally, if the CPUC decides not to proceed with the master lease structure, it could promote an educational and technical assistance program to help commercial property owners understand and independently acquire off-balance-sheet commercial lease financing.

Recommendation 5: Leverage bond financing for ESCos

Similar to the government and institutional sectors, commercial property owners consider acquisition of financing a major barrier to adoption of energy efficiency. The CPUC should consider structures—such as a bond financing mechanism—that make low-cost capital available directly to ESCos.

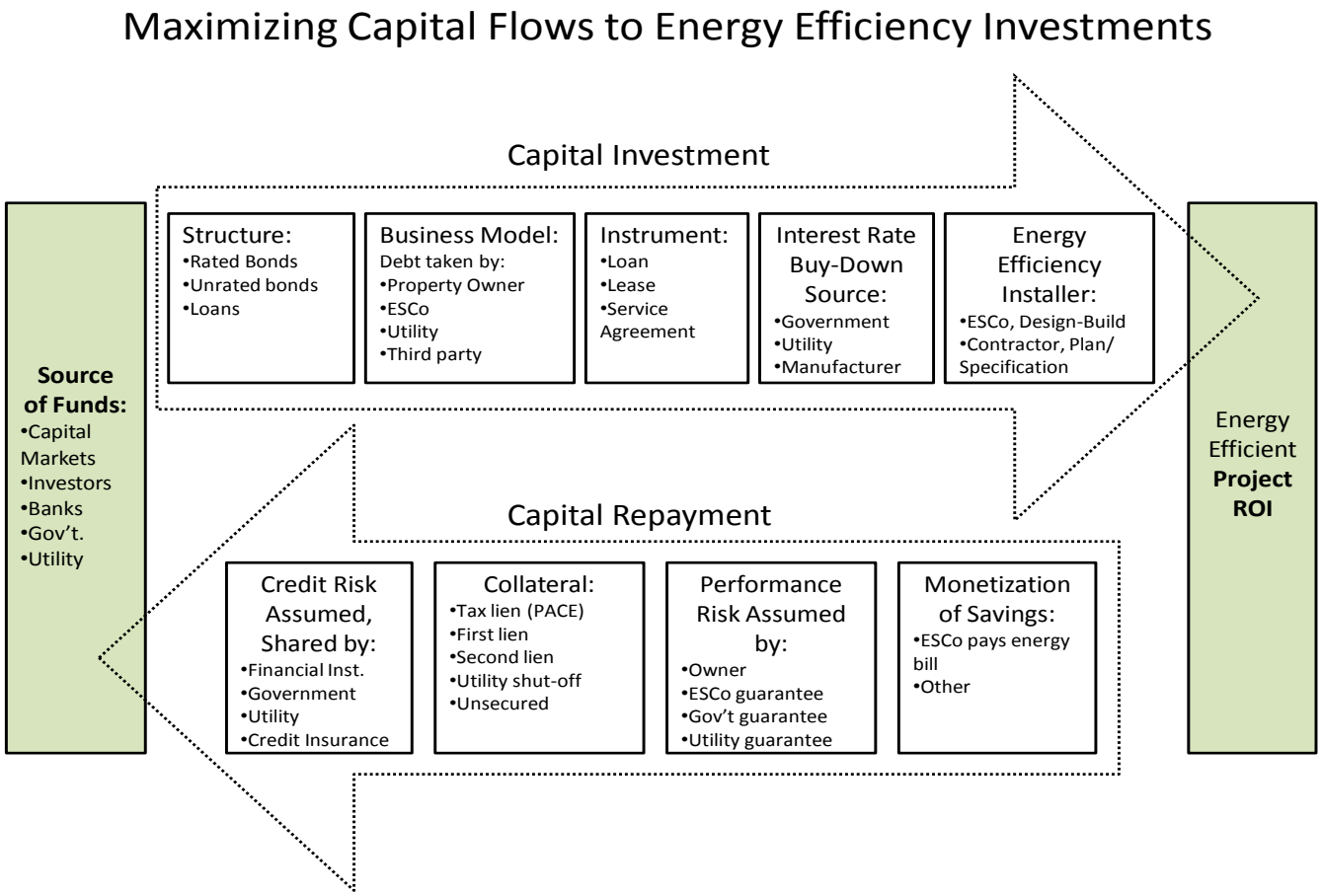
Recommendation 6: Transform the performance contracting business model to energy services

Similar to the government and institutional sectors recommendation, the CPUC should consider models that provide capital directly to ESCos, because doing so would eliminate a major barrier to acquisition of energy efficiency. The goal of promoting energy efficiency is to reduce consumption, however, not simply to fund capital projects. Consequently, the CPUC should consider working with the performance contracting business community and recent innovators of new energy services compensation models to promote energy savings-based compensation.

Regarding cost per unit of energy saved, there are two key elements. Larger buildings have more total energy consumption and more energy consumption per square foot (high-rise office building vs. a home). Consequently, shorter paybacks and lower relative transaction costs are typical. In addition, larger buildings tend to be owned and occupied by entities that have a more rigorous attitude toward economic decision making, (again the office building vs. home comparison), and they are willing to take action if the project meets financial requirements (which may include off-balance-sheet). Consequently, larger projects—unlike small commercial and residential ones—should not require substantial subsidies. These recommendations affect financing and should be compatible with other types of incentives.

Overview of recommendations

The following flow diagram lists the barriers that restrict capital flow to energy efficient investments and the options for removing those barriers.



Next Steps

Harcourt Brown & Carey look forward to presenting the results of this study to CPUC staff and to helping the CPUC develop policy initiatives for California's investor-owned utilities.

Appendices

Appendix A: Plug Loads in California by Product

Appendix Table 1. Age of California Housing Stock

Year Constructed	# of Units	Single Family Units (68% of Total)	Percent of Total
Built 2000 or later	1,257,322	854,979	9.50%
Built 1990 to 1999	1,420,886	966,202	10.70%
Built 1980 to 1989	2,099,139	1,427,415	15.80%
Built 1970 to 1979	2,496,321	1,697,498	18.80%
Built 1960 to 1969	1,887,117	1,283,240	14.20%
Built 1950 to 1959	1,909,953	1,298,768	14.40%
Built 1940 to 1949	897,388	610,224	6.80%
Built 1939 or earlier	1,300,556	884,378	9.80%
	13,268,682		**100%**

Note: This table incorporates data on all housing units. Of these housing units, approximately 7 million are owner-occupied, and 5 million are renter-occupied; the remainder are vacant homes.
Source: U.S. Census, American Fact Finder, http://www.factfinder.census.gov/servlet/ADPTable?_bm=y&-geo_id=04000US06&-qr_name=ACS_2009_5YR_G00_DP5YR4&-ds_name=ACS_2009_5YR_G00_&-_lang=en&-_sse=on; 2009.

Appendix Table 2: Plug Loads

Product Category		Average Products per Household	Annual Energy Use - Low (kWh)	Annual Energy Use - High (kWh)
Entertainment		8	644	697
Information technology		6	335	357
Other	*Small appliances*	3	51	77
	Telephony	3	17	51
	Night lights	2	10	13
	Power	3	7	7
	Personal hygiene	1	4	5
	Video	1	nearly 0	1
	Hobby-Leisure	1	nearly 0	1
	Medical	1	nearly 0	nearly 0
	Total Other	15	89	155
	TOTAL	30	1,068	1,208

Source: Final Field Research Report, Prepared for the California Energy Commission under PIER Contract #500-04-030, ESCos Consulting, Oct. 31, 2006.

Appendix B: California Building Energy Consumption and Cost Estimates

Numbers and calculations in this report, related to energy consumption/cost and installation cost/savings, by square foot, by property and by market sector are meant to provide a sense of scale and direction of the opportunity to improve the energy efficiency in California's buildings and are not intended to be a precise estimate. The data was acquired from numerous sources including: the U.S. Energy Information Administration, California Energy Commission and various independent sources (see other sources in appendices). Consequently, these numbers are preliminary and are subject to adjustment.

California Energy Consumption, Cost, Estimate of Installation Costs and Savings (based on square footage)

			Commercial				
Energy Metrics	**Residential**	**Government**	**Residential**	**Commercial**	**Commercial**	**Industrial**	
	Single Family	**Institutional**	**Multifamily**	**Small**	**Large**		
Typical Per Square Foot Metrics							**Source**
Average Energy Cost	$1.10	$1.85	$1.50	$2.50	$2.25	$9.00	GBI Tech back-up
Average Installation Cost	$4.00	$2.00	$2.00	$2.00	$2.00	$8.00	Industry averages
Average Energy Savings $	$0.28	$0.46	$0.38	$0.63	$0.56	$2.25	Calculated from 25% (below)
Average Energy Savings %	25%	25%	25%	25%	25%	25%	Unlocking EE, McKinsey, 2009
Typical Per Property Metrics							
Average Square Feet	1,800	280,014	900	6,700	51,400	100,000	Calculated
Average Annual Energy Cost	$1,980	$518,026	$1,350	$16,750	$115,650	$900,000	Calculated
Average Installation Cost	$7,200	$560,028	$1,800	$13,400	$102,800	$800,000	Calculated
Average Annual Energy Savings	$495	$80,500	$423	$3,283	$23,644	$225,000	Calculated
Simple Pay-Back Period (years)	14.5	7.0	4.3	4.1	4.3	3.6	Calculated
Per Market Sector Metrics							**Totals**
Number of properties	8,400,000	5,714	4,500,000	447,761	48,638	2,500	13,404,613
Total Square Feet	15,120,000,000.00	1,600,000,000	4,050,000,000.00	3,000,000,000	2,500,000,000	1,300,000,000	27,570,000,000
Total Annual Energy Cost	$16,632,000,000	$2,960,000,000	$6,075,000,000	$7,500,000,000	$5,625,000,000	$11,700,000,000	50,492,000,000
Installation Cost	$60,480,000,000	$3,200,000,000	$8,100,000,000	$6,000,000,000	$5,000,000,000	$2,000,000,000	84,780,000,000
Annual Energy Savings	$4,158,000,000	$459,977,000	$1,903,500,000	$1,470,000,000	$1,150,000,000	$562,500,000	9,703,977,000

Sources of Data

SF Residential data , based on 8.4 million SF homes (72% of all households are single family, Multifamily Buildings Study below) and CEC's McGraw Hill data

MF residential data, 4.5 million households at 900 square feet per unit, Improving CA Multifamily buildings, Opportunities and Recommendations for Green Retrofits, 2011

Government sector data based on Green Building Action Plan, Back Up Tech Document, Sep 2004; Institutional sector based on .25 time Government sector

Commercial, non-MF RES data (cell F/G 18) Next Ten, Untapped Potential of Commercial Buildings: Energy Use and Emissions, 2010

Commercial and Institutional, Green Building Action Plan, Back-up Technical Document, California, 2004

Industrial, U.S. Department of Energy, California Industrial Fact Sheet

Total energy (retail sales) in CA, $49.4 billion electric and gas, $3 billion other = $52.4 billion, California, US Energy Information Administration, 2008

Note: the cost to save one kWh and therm per year continuously, is estimated at $.70 and $7.00 respectively based on a 4 5 year payback

2008 consumptiondata came from CA.gov's Energy Consumption Data Management System: http://ecdms.energy.ca.gov/elecbyutil.aspx

Appendix C: California Building Energy Consumption and Cost Estimates

Numbers and calculations in this report, related to energy consumption/cost and installation cost/savings, by square foot, by property and by market sector are meant to provide a sense of scale and direction of the opportunity to improve the energy efficiency in California's buildings and are not intended to be a precise estimate. The data was acquired from numerous sources including: the U.S. Energy Information Administration, California Energy Commission and various independent sources (see other sources in appendices). Consequently, these numbers are preliminary and are subject to adjustment.

Pleasse see table on next page.

Calculations Related to California's EE Goals (based on energy units)

	Residential (SF)		Gov't/Institutional		Commercial		Industrial		
	Electric	Gas	Electric	Gas	Electric	Gas	Electric	Gas	
2008 Consumption (CA Energy Consumpton Data Management Sys.)	92,366,000,000	5,002,000,000	10,000,000,000	200,000,000	107,234,000,000	1,933,000,000	43,936,000,000	3,138,000,000	
2015 Goal (Res, 20%, G&I 20%)	18,473,200,000	1,000,400,000	2,000,000,000	40,000,000	NA	NA	NA	NA	
Annual energy units saved to meet this goal	2,309,150,000	125,050,000	250,000,000	5,000,000	NA	NA	NA	NA	
Annual $ investment required to meet this goal @$.70/kWh, $7/therm ($.70/kWh or $7/therm = an economic ~4-5 year payback)	$ 1,616,405,000	$ 875,350,000	$ 175,000,000	$ 35,000,000	NA	NA	NA	NA	
2020 Goal (Res 40%; Ind 25%, G&I 20%)	18,473,200,000	1,000,400,000	2,000,000,000	40,000,000	NA	NA	10,984,000,000.00	784,500,000.00	
Annual energy units saved to meet this goal	3,694,640,000	200,080,000	400,000,000	8,000,000	NA	NA	1,098,400,000.00	78,450,000.00	
Annual $ investment required to meet this goal @$.70/kWh, $7/therm ($.70/kWh or $7/therm = an economic ~4-5 year payback)	$ 2,586,248,000	$ 1,400,560,000	$ 280,000,000	$ 56,000,000	NA	NA	$ 76,888,000	$ 549,150,000	
2030 Goal (Comm, 50%)	NA	NA	NA	NA	53,617,000,000	966,500,000	NA	NA	
Annual energy units saved to meet this goal	NA	NA	NA	NA	1,787,233,333	32,216,667	NA	NA	
Annual $ investment required to meet this goal @$.70/kWh, $7/therm ($.70/kWh or $7/therm = an economic ~4-5 year payback)	NA	NA	NA	NA	$ 1,251,063,333	$ 225,516,667	NA	NA	
									Totals

Estimate of Annual Investment Required per Year (based on assumptions above)

2011	$ 1,616,405,000	$ 875,350,000	$ 175,000,000	$ 35,000,000	$ 1,251,063,333	$ 225,516,667	$ 76,888,000	$ 549,150,000	$ 4,804,373,000
2012	$ 1,616,405,000	$ 875,350,000	$ 175,000,000	$ 35,000,000	$ 1,251,063,333	$ 225,516,667	$ 76,888,000	$ 549,150,000	$ 4,804,373,000
2013	$ 1,616,405,000	$ 875,350,000	$ 175,000,000	$ 35,000,000	$ 1,251,063,333	$ 225,516,667	$ 76,888,000	$ 549,150,000	$ 4,804,373,000
2014	$ 1,616,405,000	$ 875,350,000	$ 175,000,000	$ 35,000,000	$ 1,251,063,333	$ 225,516,667	$ 76,888,000	$ 549,150,000	$ 4,804,373,000
2015	$ 1,616,405,000	$ 875,350,000	$ 175,000,000	$ 35,000,000	$ 1,251,063,333	$ 225,516,667	$ 76,888,000	$ 549,150,000	$ 4,804,373,000
2016	$ 2,586,248,000	$ 1,400,560,000	$ 280,000,000	$ 56,000,000	$ 1,251,063,333	$ 225,516,667	$ 76,888,000	$ 549,150,000	$ 6,425,426,000
2017	$ 2,586,248,000	$ 1,400,560,000	$ 280,000,000	$ 56,000,000	$ 1,251,063,333	$ 225,516,667	$ 76,888,000	$ 549,150,000	$ 6,425,426,000
2018	$ 2,586,248,000	$ 1,400,560,000	$ 280,000,000	$ 56,000,000	$ 1,251,063,333	$ 225,516,667	$ 76,888,000	$ 549,150,000	$ 6,425,426,000
2019	$ 2,586,248,000	$ 1,400,560,000	$ 280,000,000	$ 56,000,000	$ 1,251,063,333	$ 225,516,667	$ 76,888,000	$ 549,150,000	$ 6,425,426,000
2020	$ 2,586,248,000	$ 1,400,560,000	$ 280,000,000	$ 56,000,000	$ 1,251,063,333	$ 225,516,667	$ 76,888,000	$ 549,150,000	$ 6,425,426,000
2021					$ 1,251,063,333	$ 225,516,667			$ 1,476,580,000
2022					$ 1,251,063,333	$ 225,516,667			$ 1,476,580,000
2023					$ 1,251,063,333	$ 225,516,667			$ 1,476,580,000
2024					$ 1,251,063,333	$ 225,516,667			$ 1,476,580,000
2025					$ 1,251,063,333	$ 225,516,667			$ 1,476,580,000
2026					$ 1,251,063,333	$ 225,516,667			$ 1,476,580,000
2027					$ 1,251,063,333	$ 225,516,667			$ 1,476,580,000
2028					$ 1,251,063,333	$ 225,516,667			$ 1,476,580,000
2029					$ 1,251,063,333	$ 225,516,667			$ 1,476,580,000
2030					$ 1,251,063,333	$ 225,516,667			$ 1,476,580,000

Yellow = Milestone

Appendix D: Sub-Segments of the Single Family Energy Efficiency Market

Energy Efficiency Financing for the Single Family Residential Sector			
Homeowner mindset:	A Reactive Homeowner	A Proactive Homeowner	
Opportunity to take EE action:	• Reacting to failed HVAC system	• Responding to whole house opportunity • Concerned about home comfort • Concerned about high energy costs • Responding to DSM program • Shopping in big box hardware store	• Refinancing home • Purchasing home
"Call to action":	• HVAC contractor's proposal	• Conventional media: TV, radio, newspaper • Social Media: web, search interception, viral, etc. • Direct mail • Utility bill insert • Contractor (whole house or other) • Word-of-mouth referrals	• Real estate agent • Loan officer • EEM facilitator
Scope of installation:	• New HVAC system	• HVAC plus ductwork, insulation, seal-up, lighting, controls, windows, etc.	
Typical project size:	$7,000	$12,000	
Transactions/year in CA:	320,000 (8 million sf home, 25 yr life for HVAC)	Unknown but millions meet at least one of the "opportunities" listed above, to take action	800,000 (Year-to-year varies dramatically but a conservative estimate: 5% refi and 5% purchase per year)
Appropriate financing product:	Point-of-sale, unsecured Financing	Second Lien Mortgage (PowerSaver, 203k)	First Lien Mortgage (Energy Efficient Mortgage)
Opportunity for public policy impact:	Provide incentives and tools to cause HVAC contractors to up-sell to whole house projects	Continue to provide incentives and tools for HVAC contractors and home performance contractors to respond to these opportunities	Provide financial incentives to real estate brokers and loan officers to incent them to accept the added complexity of an EEM origination