Annotated Bibliography of Preliminary Research Documents

An AB 549 Project Interim Report

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1. 2000 Market Effects Study of the TOSER EEM Program-Updated Final Report

XENERGY Inc., Oakland, CA, March 1, 2001. Prepared for PG&E and Staples-Hutchinson.

"This report presents the results of an assessment and market effects study by XENERGY Inc, of Pacific Gas and Electric's Time of Sale Energy Renovation (TOSER) Program. The TOSER Program addresses energy efficient mortgages (EEMs) for homes, primarily when existing homes are being resold. The EEM has the potential to overcome the financial impediments by allowing the buyer to qualify for financing for the efficiency improvements and by making the buyer aware that, even with higher monthly loan payments, her combined financing and utility costs will decline. Both real estate agents and lenders can be key players in the EEM process. The real estate agent can play a major role in the EEM process by acting as a "gatekeeper" and first point-of-contact for the homebuyer. Often the agent is the conduit through which potential buyers learn what EEMs are and their benefits. The lender's role is critical because she must be knowledgeable about EEMs and willing to implement them with minimum complications.

The TOSER Program is a PG&E program initiated in 1999, which builds upon the 1998 third-party Energy-Aware Housing Agent Program (EAHAP). The TOSER Program focuses on increasing the use of EEMs for all PG&E-area homes purchased through the U.S. Department of Housing and Urban Development's (HUD's) Federal Housing Administration (FHA) loans and homes financed through the Department of Agriculture's Rural Housing Program. TOSER's primary intervention is training aimed directly at influencing the key housing supply-side market actors —lenders and real estate agents. Its secondary activities are directed at facilitators (contractors who provide EEM/HERS services) and home loan consultants, and new efforts in 2000 were implemented to reach homebuyers. We estimated, based on HERS rating data for 150 houses in the PG&E area that the upgrades conducted through each EEM saved the homebuyer 3,261 kWh per year and 384 therms of natural gas per year.

Significant supply-side barriers that remained after the seminar included these:

- Lack of agents/lenders who acted as examples or "EEM champions "
- Lack of buyer interest in or understanding of EEMs.

Following recommendations to improve the TOSER program:

- Continue to increase marketing to potential buyers
- Target EEM promotions to areas identified that are more likely to implement EEMs

- Continue recent efforts to increase the visibility of industry leaders who have successfully promoted EEMs actively
- Implement follow-up with the training attendees
- Develop and make available additional EEM cost and benefit information
- Investigate ways to address buyer concerns about facilitators and contractors
- Clarify the dollar limits for EEMs in the training course and materials
- Improve the training components that address home energy ratings
- Tailor training to the different market actors
- Expand the training to increase the emphasis on EEMs with conventional loans."

2. Energy Efficiency of Buildings in Cities, Chapter 10: Case Studies

This report describes a number of case studies of energy efficient retrofits on a large scale. This includes St. Paul, Portland, and Minneapolis, and to a lesser extent the programs in Boston, Pittsburgh, and Baltimore. The Portland retrofit program links utilities and citywide regulation. The Minneapolis retrofit program links utilities and neighborhood groups. The Boston, Pittsburgh, and Baltimore programs link housing rehabilitation and retrofit programs

Additional case studies are presented for the prospects for urban buildings retrofit in five typical cities: Buffalo, Des Moines, Jersey City, San Antonio, and Tampa.

In 1979, the city of Portland passed an ordinance outlining a comprehensive energy policy for the city. It included the following regulation:

"The retrofit of existing buildings for the purpose of energy conservation shall be accomplished through voluntary actions initially, with mandatory requirements imposed five years after the adoption of the policy. Retrofit programs and the requirements must be cost effective, comprehensive, and have the most equitable impact possible on all sectors of the community."

"Property owners are required to install, before selling the building, any measure that is estimated to pay back in energy savings in 10 years or less. Subsidized financing is available. Both local utilities offer free audits and zero interest loans, with repayment upon sale of the home. PECI assembled a $15 million loan pool in addition to a $3 million grant, targeted to rental housing and commercial and industrial properties. The incentive package includes zero interest 1-year loans to businesses and investor-owners of residential properties for audits. PECI also offers rebates for the audit costs for businesses that invest in retrofit measures recommended in the audit."

- Ordinance No. 148251, "An Ordinance Adopting an Energy Conservation Policy for Portland," Aug. 15, 1979.

- John H. Alschuler, Jr, Community Energy Strategies: A Preliminary Review. A report to the Ford Foundation, May 1980.

The Energy Bank program in Minneapolis will finance energy efficiency retrofits up to $3000 per home. The program funding comes from a revenue bond issued by the city. In addition, the local gas utility provides customers with a rebate of up to $100 for installing approved energy saving equipment. An energy use audit is a prerequisite for the Energy Bank loans.

- Ken Nelson, Minnesota House of Representatives; Sheldon Strom, Minneapolis City Energy Coordinator; Eric Nathanson, Minnesota State Housing Authority.

From 1975 to 1980 the Pittsburgh rehabilitation program made over 5600 loans for owner-occupied property and over 600 loans for rental property rehabilitation. This program also has an energy efficiency component. Owners of buildings with from 1 to 25 units can receive a grant of up to $2000 per unit toward energy efficiency improvements. The tenants must be within the limits of the Section 8 low-income program, that is, with income below 125 percent of the poverty level. The grant limit is $50,000 per building, which is funded from $2 million in CDBG funds.

- Paul C. Brophy, director, and Norma Sue Madden, real estate analyst in the Pittsburgh Department of Housing

The Boston weatherization program is funded by $5 million in CDBG funds and provides free energy audits and energy-improvement rebates to owner-occupants of 1 to 6 unit properties. The city funds any code-related repair related to energy efficiency. The program is designed to especially attract small multi-family owners. Moderate-income owner-occupants receive a 20-percent rebate on the improvements to their unit and a 40-percent rebate on improvements to tenant units.

- Karen Sumarborg, planning director, Mayor's Office of Housing, Boston.

The Baltimore energy efficiency retrofit program provides low interest 7-year loans, funded out of a $2 million municipal bond issue. The loan is limited to owner-occupied 1 to 4 unit properties. This program is Baltimore's most popular retrofit program but not the only one available. It specifically focuses on assisting owners of the smaller properties that compose the majority of Baltimore's housing stock.

- Anna Baumann, assistant to the Mayor's Energy Coordinator, Mayor's Office of Housing, Baltimore.

3. Comprehensive Whole-House Residential Retrofit Program

California Building Performance Contractors Association, San Francisco, CA, January 15, 2002. Prepared for CPUC.

Contact information: Mr. Don Solem, Timothy Locke, Mitch Fine, Jon Kaufman, Scott Johnson, CBPCA, 550 Kenny Street, Suite 1010, SF, CA94108. Fax: 415-788-7858

"This is an information-only program, with all energy efficiency improvements to be done by private providers without incentive payments from this contract. We will create a permanent infrastructure that solicits and trains providers in whole-house retrofit and business skills, develops a consumer market for those capabilities, connects the providers and consumers, protects quality, and grows from a single city to others during its two-year term and creates momentum for further self-supported expansion statewide.

The Association will attract, train, and certify all required specialists, and conduct an intensive market development campaign for consumers in the target locations and market segments. Interested consumers will be directed to qualified whole-house providers, who will do a detailed diagnosis of the home, explain options, make the sale, and arrange the improvements on a turn-key basis. The Association will retain its member providers through its ongoing services, and will build support for permanent operations through dues, fees, and sponsorships by suppliers and private foundations.

The diagnostic tests include, but are not limited to, whole house pressurization and depressurization, zonal pressure mapping (to determine positive and negative pressure zones), duct pressurization, infrared thermography temperature readings and CFM flow rates across the air handler and at individual registers, Combustion Appliance Safety Testing, airborne particulate identification and quantification, and comprehensive health, safety, and efficiency testing of HVAC equipment including vapor compression cycle equipment as well as gas furnaces."

4. Whole House Contractor Team Accreditation: Development of a Feasible Model and Implementation Process

Bevilacqua-Knight, Inc. and Performance Systems Development, Inc., July 12, 2000. Prepared for Energy Efficiency Division, CEC.

Contact information: Robert L. Knight, Bevilacqua-Knight, Inc.

Gregory Thomas, Performance Systems Development, Inc.

"The study's specific objective is to demonstrate how improved building and testing practices could be evolved in California, backed by credentialing of specialty contractors and built into the Title 24 system. Such an objective requires not only effectiveness in increasing statewide energy efficiency in home

renovation and new construction but also cost-effectiveness, consumer protection, avoidance of legal liability concerns for the State as well as other participants, and support by key stakeholder groups such as contractor trade associations, consumer and environmental advocates, local public officials, operators of existing Federal and State energy efficiency programs, and existing construction training and testing authorities.

The proposed leapfrog strategy is to create a new "building performance contractor" industry for high-performance new homes as well as retrofits to existing homes. This strategy establishes the new industry as an elite contracting corps with unique capabilities, providing a totally new kind of value through integrated new home systems design and construction as well as whole house diagnosis and retrofits to existing homes. Building performance contracting, as envisioned in this study, would include contractor self-testing of their work, requiring no regulatory changes."

5. Nonresidential Remodeling and Renovation Study: Final and Summary Report

ADM Associates, Inc. and TecMRKT Work LLC, March 2002. Prepared for CEC.

"The overall purpose of this study (NRRR Study) was to collect and analyze data with which to characterize nonresidential remodeling and renovation market activity in California. The project had four major goals:

- To characterize the decision-making process for purchases of energy using equipment during remodeling or renovation of nonresidential buildings;
- To describe the level and types of remodeling and renovation activity by market segment, define segments useful to program planning and implementation and quantify characteristics for segments within the NRRR market;
- To identify specific markets with a high potential to save energy; and
- To develop new strategies and program designs to promote market transformation.

One key finding from the NRRR Study has been that remodeling and renovation activities are usually driven by a change in tenant and/or a tenant changing their operation. If program implementers want to capture more of the NRRR market, they may need to focus on tenancy changes as a key to identifying space that is likely to be renovated. If implementers can track potential tenancy changes, they can then anticipate remodeling and renovation activities. Being able to anticipate remodeling and renovation increases the possibility that program implementers can capture market driven projects in the early implementation stages, which in turn increases the potential for introducing energy efficient design and equipment.

A possible strategy for identifying space that is to be renovated is to work with leasing agents who specialize in commercial lease space. There are also real estate statistical consulting services that maintain databases identifying cases where leases are expiring. By working with such firms, program implementers can identify space that is coming to market in sufficient time to promote energy efficiency when changes to space are being made. Landlords and/or tenants who are candidates for an energy efficiency program can be identified on a continuous basis and marketed to directly with mailings that describe the program and the benefits that they can realize from installing energy efficient equipment."

6. 1999 State-Level Small/Medium Nonresidential MA&E Study: Final Report, Volume 1 of 2

XENERGY Inc and Quantum Consulting Inc., December 6, 2000. Prepared for PG&E.

Contact information: XENERGY Inc., Oakland, California
Quantum Consulting Inc., Berkeley, California

"The overall study consists of two primary components:

1) An assessment of the baseline characteristics of the current market for the small nonresidential sector programs, as well as any other types of energy-efficiency products and services that early analysis suggests may be significantly affected by the programs;

2) A broadly focused process evaluation of a) the1999 Small Business Standard

Performance Contract (SBSPC) Program and b) the utility incentive programs (the statewide 1999 Express Efficiency Program) to assess their effectiveness at reaching and influencing the target market sector.

Overall attitudes toward energy-efficiency investments vary by customer type:

- Customers in the office category generally have more positive attitudes and perceptions about energy-efficiency investments.
- Customers in the retail category tend to have more negative attitudes and perceptions.
    - The results for institutional customers are the most mixed.

Larger customers are:

- More likely to feel in control of energy-efficiency investments,
- More likely to believe that efficient equipment will perform at least as well as standard equipment,
- More likely to exchange energy-efficiency information with others, and
- Less likely to feel that lack of financing is an investment barrier.

About 80 percent of California small/medium customers are unaware of any specific or generic energy-efficiency programs. Office and institutional customers are most likely to be aware of some programs.

The small/medium business market consists of approximately one million accounts and probably roughly three-quarters of a million customers. This market is characterized by a number of significant barriers to the implementation of cost- effective energy-efficiency measures. These customers lack the expertise, staff, experience, time, and other resources to assess energy-efficiency opportunities comprehensively and confidently. Half the customers rent or lease their space and, hence, have concerns about their ability to control and benefit from energy-efficiency investments. Actual implementation rates for even the most cost-effective, easily retrofitted energy efficiency measures are low."

7. Market Assessment & Evaluation Study in Support of Codes & Standards: Final Report, Volume 1: Project Descriptions and Results

Pacific Consulting Services, Davis Energy Group, and Eley Associates, August 31, 2000. Prepared for PG&E.

Contact Information: Mary G. Dimit, PG&E
William Pennington, CEC
Davis Energy Group.
Eley Associates.

"Objective 1. This study should assess strategies for improving the construction industry's effectiveness in installing energy efficiency measures commonly used to achieve compliance with California's Title 24. It should focus particular attention on building commissioning (in the nonresidential sector), diagnostic testing (in the residential sector), third party inspections, and linkages between construction quality and insurance liability concerns.

Objective 2. This study should assess how utilities, either informally or through formal PGC-funded programs, can more effectively influence the standards development and implementation process by promoting consensus for incorporation of industry best practices in the standards. In doing so, this study should document how the codes and standards process can work synergistically with PGC-funded programs to achieve stated program objectives.

Recommendations for Residential Construction

1. Require mechanical drawings as part of design documents for building permits.

2. Require certification of HVAC and insulation contractors and installers. Tie the certification to successful completion of training courses. Require an affidavit from contractors documenting satisfactory self-

inspection results and performance testing reports as precondition for issuing occupancy permit.

3. Establish mechanisms to conduct random, third-party inspections for quality control.
4. Use PGC funds to conduct contractor and installer training on proper installation, proper testing, and recent changes to Title 24.
5. Use PGC funds to augment and train local building inspectors on the "house as a system" approach.
6. Conduct additional research to quantify potential non-energy benefits of a systems approach to home construction. Quantify the benefits from reduced callbacks and reduced exposure to litigation.
7. Increase consumer education on energy efficiency by way of a mass media public awareness campaign.
8. Establish simple, standardized diagnostic testing procedures.
9. Simplify Title 24 while raising the standards (i.e., make them more stringent but easier to understand and apply).
10. Offer state tax credit for green and tested, energy-efficient buildings to both builders and consumers."

8. Statewide Small/Medium Nonresidential Customer Needs and Wants Study: Final Report

Quantum Consulting Inc. and XENERGY Inc., December 2001. Prepared for PG&E.

Contact Information: Chris Ann Dickerson, PG&E
Quantum Consulting, Berkeley
Xenergy Inc., Oakland

This study presents the results of interviews and focus groups of customers that make up California's under 500 kW population. The study found that an overwhelming number of small/medium customers – 92% – are conserving in order to reduce their energy costs. Small/medium customers are primarily adopting no cost conservation measures such as reduced lighting levels and thermostat adjustment. Despite a strong desire to reduce operating costs, customers have responded with no cost conservation practices and lighting retrofits. Unfortunately, lighting retrofit are the only significant investment-type actions customers are taking. 2001 has been a success story for lighting – both turning lights off and retrofitting them with T-8s, CFLs and controls. However,

with the exception of lighting retrofits, customers remain reluctant to make energy efficient investments, citing lack of funds. It is money that deters small/medium customers from making bigger investments. Higher electricity prices have not yet removed the first cost barrier.

9. Home Energy Evaluation System: Marketing Plan, Final Report

NEOS Corporation, Lafayette, CA. June 1992.

In an effort to decrease peak load requirements and energy use in the existing housing market, the CEC, the California Energy Extension Service (CEES), and the Turlock Irrigation District (TID) have developed a pilot Home Energy Evaluation System (HEES) test project in TID's service territory.

The success of the HEES program depends on the cooperation of a great number of participants. The parties most likely to be opposed to particular elements of the program are homeowners, homebuyers, real estate agents, and lenders.

- To achieve TID's goal, three program objectives have been established. These are:
- To motivate customers to install energy efficiency measures through the use of free home energy surveys.
- To promote the use of Energy Efficient Mortgages through real estate agents and lenders as a method of financing home energy improvements.
- To increase public awareness of home energy conservation and energy efficiency programs offered by TID."

10. 1996 and 1997 Nonresidential DSM Bidding Retention Study: Final Report

ADM Associates, Inc., February 2001. Prepared for SCE.

Contact Information: ADM Associates, Sacramento.

This report provides the results of the retention study for Southern California Edison's 1996 and 1997 Nonresidential DSM Bidding Program. The objectives of the study were twofold:

- To estimate the percent of all selected measures installed in the 1996 and 1997 DSM Bidding Program that are still in place and operable; and
- To estimate the effective useful lives of selected efficiency measures, which included lighting measures and HVAC measures.

Under the DSM Measurement Protocols 1 adopted by the California Public Utilities Commission, Southern California Edison (SCE) is required to conduct studies to better understand the typical modes of savings erosion associated with energy-efficiency measures. In line with this requirement, ADM Associates, Inc. (ADM) has performed a study of the retention of measures installed at the facilities of SCE customers in 1996 or 1997 under SCE's Nonresidential DSM Bidding Program.

In the Nonresidential DSM Bidding Program, Energy Services Companies (ESCOs) provided energy-efficiency services to SCE's industrial and large commercial customers. ESCOs were invited to submit bids to SCE for delivering kWh and kW savings. Payments to ESCOs were based on verified savings using measurement techniques consistent with NAESCO standards. Eligible measures include, but were not limited to, indoor lighting-system replacement, lighting efficiency modifications, packaged air conditioners, heat pumps, window treatment, daylighting controls, electronic adjustable-speed drives, electric motors, electric chillers, and thermal energy storage.

11. California Statewide Residential Contractor Program Energy and Market Impact Assessment Study: Final Report

ADM Associates, Inc. and TecMRKT Works, LLC, October 2002. Prepared for SCE.

The Statewide Residential Contractor Program (RCP) as implemented in PY2000 contained two distinct elements: a Single-Family Element (SF-RCP) that applied to single-family homes, condominiums, and small attached apartments (e.g., duplex, four-plex) and a Multi-Family Element (MF-RCP) that applied to apartment and condominium complexes. Mobile homes were addressed in either program element as appropriate.

The purpose of this energy and market assessment study was to assess the energy and market impacts of measures installed through both elements of the RCP. There were four major objectives for this assessment study:

- To measure energy impacts from SF-RCP measures using data for measures installed under SF-RCP during PY2000;
- To measure energy impacts for MF-RCP measures using data for measures installed during PY2000;
- To examine and evaluate two approaches (i.e., deemed savings and measured savings) that could be applied for savings from measures installed under MF-RCP and to evaluate incentive levels for such measures; and
- To examine the diffusion of program-promoted measures and interest in these measures among contractors.

Estimates of kWh and therm savings for single-family RCP measures were developed through both econometric and engineering analysis for the following measures:

- High performance windows;
- HVAC diagnostics (kWh savings only);
- Duct testing and sealing;
- Attic and wall insulation package;
- Programmable thermostats; and
- Energy Star central air conditioners (kWh savings only).

12. California Residential Retrofit and Repair Baseline Contractor Survey Summary Report

Wirtshafter Associates, Inc., March 12, 2000. Prepared for PG&E and California Board for Energy Efficiency (CBEE).

Contact Information: Robert Wirtshafter, Wirtshafter Associates, Inc.
Pobert D. Bordner, Energy Market Innovations, Inc.
Virginia Kreitler, Kreitler Research & Consulting
Lisa Skumatz – Skumatz Economic Research Associates

This report presents findings from a statewide survey of selected residential contractors operating in the state of California. The purpose of this Baseline Contractor Survey was to establish a quantifiable assessment of the baseline practices and attitudes, related to energy efficiency, on the part of contractors who are providing services to the existing residential housing market. The results of this survey provide essential information against which the future performance of the Residential Contractor Program (RCP) and future programs may be measured.

Residential contractors from all trades feel that the “lack of consumer demand” and “the higher cost or unfavorable economics” of the high efficiency options is the most important factors preventing contractors from providing more energy efficient equipment and services. The contractors generally feel that the high cost to purchase and install the equipment is the most important factor preventing consumers from installing the equipment. While many of these respondents likely see the first-cost barrier as being important, some of these respondents also feel that the cost is high relative to annual savings. Most contractors either do not know the paybacks for major items, or see the paybacks as being greater than 5 years for major energy efficiency measures.

It is interesting that cost factors are the largest perceived barrier for HVAC and windows, and lack of consumer demand is the primary barrier for all other service types. It is also noteworthy that a large proportion of window contractors feel there are no significant barriers impeding sales of energy efficient windows.

13. California Residential Efficiency Market Share Tracking

Regional Economic Research, Inc., October 20, 2000. Prepared for SCE.

This report presents the first-year results of the California Residential Market Share Tracking project. The project, conducted by Regional Economic Research, Inc. (RER) under Southern California Edison (SCE) management, plays a significant role in market assessment and evaluation activities supporting California's publicly funded energy efficiency programs. The ultimate objective of the RMST project is to estimate and track the market shares of high efficiency measures purchased and installed in California's residential sector over the next several years. The following list includes the specific measures currently covered by the RMST:

Space Heating & Cooling Equipment:
Central Air Conditioners, Gas Furnaces, Heat Pumps

Air Duct Construction:
Air Duct Leakage

Water Heating Equipment:
Gas Water Heaters, Electric Water Heaters

Appliances:
Refrigerators, Clothes Washers, Dishwashers, Room Air Conditioners

Windows

Interior & Exterior Lighting:
Torchieres, CFL Fixtures, CFL Lamps, CFL Lamps

14. Smart Thermostat Program Process Evaluation

XENERGY Inc., December 3, 2002. Prepared for SDG&E.

This program was designed to test the viability of a new approach to residential load control and demand responsiveness, through the use of Internet technology and thermostats to affect residential air conditioning use. Through the program, customers are provided the necessary technology installation and a small incentive for program participation. The equipment deployed allows SDG&E control of the thermostat during an electrical emergency, yet allows the customer the ability to override the company signal remotely or directly at the thermostat.

Overall, customer reactions to the program have been positive – the application package was considered to be informative, SDG&E and Carrier call center staff were reported to have been very helpful, and the installation process was highly rated by participants for quality and professionalism. However, the program has suffered in several areas, ranging from marketing effectiveness to installation timeliness. The following is a summary of the principal conclusions and recommendations regarding these problem areas:

Initially, the program suffered from low customer response. However, additional direct mailings were implemented in 2002 such that approximately 4% of the target market is currently participating in the program.

The financial and operational benefits of programmable thermostats represent more effective marketing messages, as compared to the waning benefits of "doing your part" to help out in an energy crisis. In addition, participant education is needed to ensure that the programmable features of the new thermostats are being used properly. The customer survey results suggest that only 25% of participants are using the programmable features of their new thermostats.

The program suffered from considerable problems with regard to lead tracking, lags in the installation process, and inadequate customer care and follow-up. The systems established to avoid the problems should continue to be monitored for effectiveness.

15. Statewide Residential Lighting and Appliance Saturation Study

RLW Analytics, Inc., June 2, 2000.

A total of 1,258 on-site surveys were completed between December 1999 and March 2000. While on-site, the surveyors collected data on the major appliances and lighting systems in the home. The surveyors collected nameplate data for eight major appliances: Refrigerator-Freezers, Self-standing Freezers, Dishwashers, Clothes Washers, Clothes Dryers, Water Heaters, Heating Equipment, and Cooling Equipment. The auditors collected lamp and fixture data on each lighting fixture within the home, as well as the front porch fixture. The on-site surveyors also collected data on attic, floor and wall insulation R-values, wall construction, and window type.

16. Statewide Survey of Multi-Family Common Area Building Owners Market, Volume 1: Apartment Complexes

ADM Associates, Inc. and TecMRKT Works LLC. June 2000.

Contact Information: Shahana Samuillah, SCEC

There are an estimated 28,650 apartment complexes in the combined service areas of Pacific Gas and Electric, Southern California Edison, Southern California Gas, and San Diego Gas and Electric. These complexes have 2.89 million apartment units. About 70 percent of the complexes were built in the 1970s and 1980s, while just 7 percent were built in the 1990s.

Operators for about half of the apartment complexes claimed to have made energy efficiency improvements to their complexes. Most of these were for outdoor or indoor lighting. With the exception of swimming pools, 83 percent or more of the respondents cited energy efficiency as the motivation for making the improvements. Reducing company operating cost was typically cited as a reason

for making the changes half as often. Thus, more than half of those who are making changes are making them for reasons of energy efficiency but not for reducing operating cost. These differences are dramatic and suggest that many decision makers are electing energy efficiency for reasons other than cost.

From a program perspective, it is important to recognize that decision makers may not see the connection between energy efficiency and reducing energy costs. Another possibility is that the total cost of energy in a complex is not a very strong incentive to improve energy efficiency. The promotion of energy efficiency improvements may be more successful if they are promoted for other reasons. It may be more effective to promote equipment changes for reasons such as safety, reliability and replacing poorly working equipment.

The predominant type of outdoor lighting is incandescent, which accounts for 37 percent of the connected load. Other common types of outdoor lighting include high pressure sodium (12 percent of the connected load), four-foot fluorescent (12 percent), pin-based compact fluorescent (11 percent), mercury vapor (7 percent), and metal halide (3 percent).

The predominant type of indoor lighting is four-foot fluorescent, which accounts for 45 percent of the connected load. Other common types of indoor lighting include incandescent (31 percent of the connected load), pin-based compact fluorescent (7 percent), eight-foot fluorescent (4 percent), CircleLine fluorescent (4 percent), and incandescent exit signs (3 percent).

17. 1996 & 1997 Measure Retention Study Residential Weatherization Retrofit Incentive Program

Knight Research. March 2001. 0304/Reference Mtls/CALMAC Resources 4 / Weatherization retrofit incentive program.pdf

The purpose of this study is to collect data to determine the retention and effective useful life (EUL) of the primary measures specific to each program. This involves measuring the proportion of measures still in place and operational since their initial installation.

The current study is a Retention Study for the 1996 & 1997 Residential Weatherization

Retrofit Incentive Program (RWRI) operated by San Diego Gas and Electric

(SDG&E). Program protocols require that Retention Studies evaluate the top 10 measures or 50% of the estimated resource value (whichever number of measures is less). Under this protocol the primary measures for the current study are: Attic insulation and Infiltration

Nearly all (99%) of the attic insulation and 90% of the infiltration measures remained in place. Confidence intervals were calculated at an 80% confidence interval.

18. Residential Energy Efficiency Program: Evaluation of a Pilot Demonstration in Lakewood, New Jersey.

Prepared by the Melon Institute of Research for the U.S. Department of Energy, Contract DE AC01 CS 22054, June 1983.

Contact Information: Sandra Rennie; Alton Penz

This report presents the results of the Residential Energy Efficiency Program (REEP) to impact residential energy retrofit. It is targeted to support private companies and utilities involved in systematic residential retrofit.

Project goals include saving money and energy for householders; providing a new source of supply to utilities at prices lower or equal to their current purchase rate; improving local economy by stimulation of new business activity; and meeting public policy goals through improved energy efficiency.

Method employed: A private energy company sells to a utility “saved energy” mined from its residential clients at a pre-agreed rate over a specified time interval. The utility can sell this energy at decontrolled prices. The energy company saves energy by targeting one neighborhood at a time, retrofitting houses in it. The houses bear no cost of the project and are responsible only for enthusiastic energy conservation participation.

Initial results of this pilot study displayed a win-win situation. REEP participants (house occupants) became more conscious of health energy saving habits like lowering thermostat settings, etc. They reported an increase in comfort levels and decrease in average cost for heating – 10 to 15%. (Differential varied with nature of fuel – gas/electricity and retrofit/commissioning labor and time input per house)

Plan constraints include the initial cost incurred by the energy company – relative high if the company is a start-up or small in nature. This is primarily due to the absence of any monetary input from the household itself, which in itself is caused by the difficulty in displaying “cause and effect” to them. This makes the value of service to the utility highly critical. Secondly, amount of savings varied strongly with the quality of workmanship provided for the retrofit.

Issues of concern: A well-defined payment plan from the utilities needs to be designed for effective execution of project. Households associate reduced energy consumption with increased discomfort. Hence improvement in comfort conditions is a strong market motivator. If motivated for energy performance, they are reluctant to make individual changes.

19. Review of Existing Residential Energy Efficiency Certification and Rating Programs.

Pacific Northwest Laboratory, Battelle Memorial Institute. Prepared for the U.S Department of Energy under Contract DE-AC06-76RLO 1830, November 1986.

Contact Information: Paul Hendrickson

The report primarily presents information on existing Home Energy Rating Systems (HERS) and their features. The objective is "to facilitate the incorporation of energy efficiency factors into a housing unit's market value".

HERS describes the resistance offered by owners of existing residences to energy efficiency programs. These include poor payback since the weatherization investment cannot be recovered in rents; time and cost involve in retrofits and obtaining ratings and the inability to effectively weatherize older buildings (e.g. adding insulation to flat roofs).

HERS has defined types of housing to be considered as single family (detached and attached), multifamily and mobile homes (HUD-code homes). The marketing cost in single-family homes is higher since each homeowner needs to be contacted individually. Promotional devices include mailings, flyers, telephones calls, newspaper articles and door-to-door personal contact. Positive response rates averaged 13%. Reasons for non-participation include previously received energy audits, belief of "underlying motive as sell something", satisfaction with present energy costs, belief that no energy improvements were required, or beliefs by home renter that the owner would be disinterested. Moreover, prospective buyers and renters have energy efficiency information other than ratings such as utility bills, house (HVAC and water heating) inspection for bank loans, and prior energy audits. Multifamily housing faces similar constraints. Moreover, there are many owners, many of which are likely to be non-local residents.

A recommended mechanism is to allow utilities to make past billing records easily available to prospective purchasers/ renters to allow more informed decisions. Another method is mitigation of liability. In Georgia, existing homes had less insulation than required by Good Cents certification due to omission of onsite inspections after preliminary compliance inspection. The building and insulation contractors paid for most of the cost for the correction of insulation deficiencies.

The report also talks about the constraints in determining savings from an energy efficiency program. The constraints are due to the influence of other government/utility incentive conservation programs, changes in building codes, fuel prices, interest rates and expectations, family structure and lifestyles, and weather.

A comprehensive list of rating programs in 1986 is listed below.

1. Energy Star – operated by the city of Austin, Texas.
2. California Energy Commission HERS Pilot Programs – in Pasadena and Roseville.
3. CONN SAVE – in Hartford, Connecticut.
4. Home Heating Performance Rating – offered by the Denver Energy Resource Center.

5. Save Home Program – by the Home Builders Association of Greater Kansas City.
6. Home Heating Index – by the Iowa State University Energy Extension Service.
7. High Energy Performance Label – by the Ministry of Urban Planning and Housing (France).
8. Five Star Home Award Program – by the State of Florida, Florida Energy Efficiency Code.
9. Shelter Industry Energy Rated homes – Western Resource Institute.
10. Good Cents Program.
11. Energy Voluntary Improvement Program – Ann Arbor Energy Office.
12. Energy Idea Home Award and Energy Saver Home Award – Arkansas Power Company.
13. Double E, Super E and Double E Retrofit Home Programs – by the British Columbia Hydro.
14. R-2000 Super Energy Efficient Home Program – by the Canadian Home Builders' Association.
15. Common Sense Homes – Carolina Power and Light.
16. Best Home Program – by the Cascade Natural Gas Corp. in Oregon and Washington.
17. Energy Efficient Home Program – by the Cedar Falls Utilities in Iowa.
18. Energy Management Construction by Cobb Electric Membership Corp.
19. 100 Plus Program – by the Connecticut Light and Power Co.
20. Energy Action Home Program.
21. Energy Efficiency and Fuel Efficiency Awards – by the Detroit Edison Co.
22. Energy Efficient Structure Program – by the Duke Power Co.
23. Energy and Super Saver Awards – Florida Power Corp.
24. E-300 Structure – Greenville Utilities Commission.
25. Payback Plus home – Iowa Power and Light Co.
26. Manufactured Home Energy Value Award – Lakeland Electric and Water.
27. Energy Conquest Home – Manville Corp.
28. Power Saver Home Program – Modesto Irrigation District.
29. Energy Efficient Home Award – Nevada Power Co.

30. Thermal Crafted and Energy Qualified Home – Owens-Corning Fiberglas Corp.
31. Excellence in Energy Efficiency – Philadelphia Electric Co.
32. Energy Efficient Home Award Program – by Santee Cooper in South Carolina.
33. Energy Efficient Home Program – by Southwestern electric Power Co. in Arkansas, Louisiana and Texas.
34. E-7 Energy Conservation Award Program – Suburban Maryland Building Industry Association in Maryland and Virginia.
35. Energy Saver Home Program – Tennessee Valley Authority
36. Energy Checked Efficiency Home Program – by the Texas-New Mexico Power Co.
37. Hug 'N Snug Energy Saver Home Program – United Illuminating Co.
38. Energy Saver Home – by the Virginia Electric and Power Co.
39. Energy Saving Plan Award – by the West Texas Utilities Co.

20. Home Energy Evaluation System Marketing Plan.

Prepared by the New Energy-Environmental Options and Solutions, for California Energy Commission, Contract #400-89-011, June 1992.

Also under name: Home Energy Evaluation System – Final Report.

Prepared by the New Energy-Environmental Options and Solutions, for California Energy Commission, Contract # 400-89-011, March 1993.

The report presents marketing strategies for the Home Energy Evaluation System (HEES) developed by the California Energy Commission (CEC) and the Turlock Irrigation District (TID). The objectives of the program were to motivate homeowners and buyers to actively pursue home energy efficiency; to train businesses and individuals to promote energy efficiency concepts to homeowners and buyers; and to generate community interest in energy conservation programs.

In a detailed market analysis the report describes influential economic factors as the housing market and the interest rates for mortgages. As a part of its customer analysis the report divides them into Home Owners/Buyers and Participants. The participants include real estate agents, lenders, appraisers, home inspectors, contractors, utility conservation representatives and energy equipment suppliers.

Marketing policy for residential areas is largely shaped by certain factors in the energy policy implementation target area. These are household demographic information (ethnicity/ sex/ age/ marital status distribution); housing characteristics (family homes/mobile homes/ apartments/ duplexes/ triplexes); and Customer End-Use (for fuel and appliances). Residential users were also

differentiated based on their preferences as appearance conscious, hassle avoider, resource conserver, pleasure seeker, lifestyle simplifier and value seeker. Marketing message varies for each group.

Factors that customers consider when making energy investment decisions are investment cost (savings, potential payback, expected resale value), comfort, appearance and utility trustworthiness. One big concern among homeowners is that increased insulation will create unhealthy indoor climate due to inhibited air exchange.

Market barrier for real estate agents is primarily the element of the unknown. They also perceive energy programs as added complications that may shy away buyers and that an energy efficient mortgage reduces their commissions. The common acceptance barrier for lenders is a conservative, tradition-oriented attitude with a reluctance to accept innovations that are not economically advantageous. Moreover they are concerned that the energy efficient mortgages will extend the loan processing time.

TID resources include its quarterly newsletter “Update” included with the customers bill, local media, local clubs and HEES participants. HEES’s core strategy is divided into strategy for customer target, public awareness, participant support and participant involvement.

Marketing programs are divided into primary and secondary programs. Primary programs can be implemented at low cost during pilot period. They include mailing brochures, developing market theme and logo, speaking engagements, newspaper releases, television, cable and radio public service announcements, booth displays, utility bill messages and seminars. Secondary programs can be implemented after pilot period and has higher implementation costs. They include presenting energy conservation awards, poster displays, bumper stickers, fact sheet development for measures and technologies, and canvassing high potential homes.

21. Austin Energy Star Builders Handbook

Prepared by Infinite Energy (Denver, Colorado) for Resource Management Department, city of Austin, Denver, TX. September 1985.

The Energy Star Rating System is designed to counterbalance increased construction cost of energy efficient homes by stimulating market demand for them. The star designations are awarded for energy conserving features that exceed the current building code standards. A maximum of 600 points can be earned with one star rating between 100 to 249 points, two stars, between 250 and 399 and three star 400 or more.

Builders participate through seminar education and then implementation in their homes. They continue to receive rebates for qualifying high efficiency equipment but have to renew membership every year. Their benefits include recognition due

to advertising, pre construction rating, certification of participation, association with more favorable loans and special training for their sales professionals.

The ratings depend on the building envelope and the heating and cooling systems. They may also be applied to existing buildings that are altered to qualify for a rating. The book gives examples of how non- rated homes were retrofitted to qualify for energy star ratings.

22. Market Penetration Projections – Austin Energy Star Program

Prepared by Infinite Energy for Resource Management Department, City of Austin, Denver, TX. February 1985

The report presents the market analysis done by Infinite Energy to understand the potential success of the Energy Star Program. Analysis is done for different parameters that positively and negatively impact builders groups, lenders, and realtors. The analysis provided a deeper understanding of factors that would motivate or de-motivate these groups and predicted how well the Austin populace was suitable for the new Energy rating program.

Prior to the analysis Infinite prepared a project curve, which showed the time period required, for the project to be successfully penetrate to 90% of the target clients. The clients were divided into five groups based on their enthusiasm for adopting new innovations.

23. Market Study and Evaluation Design – Austin Energy Star Program

Prepared by Infinite Energy for Resource Management Department, city of Austin, Denver, TX. December 1984.

The study provides market analysis suggestions for builders, lenders, realtors and home buying public. Rebate programs provided by the City of Austin Electric Utility, builders have been quite responsive to high SEER ratings. While the builders have displayed interest in Energy conservation they still need to be encouraged. Salesmen are unlikely to bring up information on energy ratings, unless the homebuyer displays interest. Energy features are not considered as the thing that makes or breaks a sale. Builders, realtors, homebuyers and lenders with greater inclinations to energy conservation can be benchmarked by audit analysis, AAB sponsored questionnaire to builders, individual interviews and focus group interviews.

24. Low Cost Furnace Efficiency Program 10,000 Furnaces Later

Prepared by Sun Power Consumer Association, revised 06/06/89.

Contact Information: John Proctor, Bobbie Foster

The report analyses a low cost heating efficiency improvement system to understand what technology and administrative system was essential to its success and were responsible for the majority of energy savings. It presents certain administrative axioms essential to the successful realization of program goals.

Better home insulation reduces exchange of air through infiltration. Liabilities associated with this include the accumulation of combustion products indoors. Instead the furnace efficiency can be improved by increasing the delivery air volume through a higher speed blower motor. Based on the Frey study data, Claridge study and the PRISM, non-linear systems and real weather it is possible "to screen furnaces in advances to determine which are the most likely to save energy and then concentrate the program on them".

As a result "forces air furnaces can be treated with a program that incorporates tight training and control. This administrative routine along with well selected technical option result in the minimum cost per Btu saved.

25. Low Cost Furnace Efficiency Improvements

Prepared by Sun Power Consumer Association, revised 06/07/89.

Contact Information: John Proctor, Sun Power Consumer Association.

The report presents the low cost furnace efficiency modification program that is to compliment Low Income Energy Assistance Program (LIEAP) and augment savings made by it. The Westside Energy Co-op (WEC) "barn raising" model for weatherizing homes concentrated on air infiltration, furnaces, windows and domestic hot water. Analysis of actual fuel changes showed a simple payback period of less than one year and for the other in less than 1two years.

Program goals include maximizing energy and minimum cost, utilizing the local community without a contractors heating license, insuring energy savings by 100%, reviewing work done and programming the plan so that most savings are long range and not for just a year. The report gives the method employed to increase savings. The program used a combination of trained installers, inspectors, form reviewers, program co-coordinator1 and a heating contractor to successfully implement the program. They were provided with the required training.

Barriers faced in the program include the program directors hesitance to include furnace options and the difficult of finding pre-trained personnel. The report emphasizes the importance of follow-ups and reviews after actual weatherization of homes to maximize returns (savings) on the program. A special note should be made for flue safety.

26. Incorporating Energy Efficiency into Residential Appraisals

Prepared by Paul Hendricks, Feb. 89.

Contact Information: Paul Hendrickson.

The report addresses the difficulty in incorporating a property's energy efficiency into its appraised value. If this can be resolved the home appraisal accuracy can be enhanced, home purchaser can enjoy better financing possibilities and energy efficient housing can be promoted through retrofit and construction.

"The lack of incorporation is largely due to perceived uncertainties whether energy efficiency affects market value in a measurable way and because of the difficulty of measuring market value impacts under of the traditional valuation approaches: income, cost, and market comparison."

Income capitalization approach is one of the suggested variations though it is often hindered by certain practical difficulties. The method does not estimate how the market capitalizes the energy savings. The computations behind its calculations can be time consuming. It is also difficult to estimate an appropriate discount rate and estimate future escalation rates of consumer process and energy cost by this method.

Alternative to this method is the sales comparison approach, which incorporates the "presentation and analysis of relevant market information". The principal difficulty with this method is the lack of information on the energy efficiency of homes. According to a study conducted by Corgel, Goebel, and Wade on single-family homes, the energy efficiency of the homes was estimated using aerial infrared photography. "One caveat is that this approach only reveals the heat loss relative to other structures without regard to a homes interior temperature."

Another practical source of information is utility bills. However here, consumption depends on the lifestyle and number of occupants. Home Energy Rating Systems (HERS) can also be used as a source of energy efficiency information.

27. Developing Markets for Energy Efficiency

NRDC/ Sierra Club Testimony for April 16-17 California Energy Commission Committee Hearing on the 1990 Conservation Report. Prepared by the Natural Resources Defense Council.

Contact Information: David Goldstein, NRDC

The report presents the potential of reaching the California state legislative energy saving goal if all conservation resources cost less than the supply side resources. It talks about the complete range of efficiency measures that are cost –effective to the California economy and how the California Energy Commission (CEC) can adopt an action plan to assure the resources are acquired.

Based on their "Initiating Least Cost Energy Planning in California: Preliminary Methodology and Analysis" NRDC and the Sierra Club project a 42 billion

kilowatt hours per year over twenty years of savings that can be achieved from a few end-use sectors. These include commercial lighting, residential lighting and a selected list of residential appliances.

28. Building Communities for Change

By Entergy for the Low Income Customer Service Annual Report, 2002.

Contact Information: list of low-income champions available in the above pdf.

The report presents the effort taken by the Entergy program to help the low-income residents of the middle South by advocating change and supporting actions that offer substantive, lasting solutions. It covers the states of Arkansas, Louisiana, Texas and Mississippi.

The program has a multi-stepped approach. It places a priority on grants and programs for the service area and promotes fuel funds for customer assistance. It also continuously approaches Washington to increase funding for LIHEAP, WAP, energy allowances for HUD and TANF. It has integrated the support and involvement of other utilities like the CenterPoint Energy, Mississippi Power CO. and the National Fuel Funds Network (NFFN) and its Energy Safety Net Project. Through a series of Regional and statewide summits during 2002, the program has doubled the number of advocate organizations involved in energy conservation.

It has also captured alternate funding sources such as the Ford Foundation, the Fannie Mae Foundation and the Foundation for the Mid South. Low-income energy conservation programs are now communicated in Spanish over 30 minute conversation videos and cable channels also to improve its outreach. Brochures advocate the Federal Earned Income Tax Credit through brochures. Finally all Entergy states except Texas have implemented the Kalkstein weather model for standardizing and improving “suspended disconnections policy” during extreme hot and cold weather.

Arkansas has conducted numerous Sharing Weatherization Efforts with Elderly People (SWEEPs) in conjunction with “Train-the-Trainer” sessions. Work includes weather stripping, replacing, windowpanes, caulking and sometimes light carpentry. After the training sessions, about 70 junior high students spent one of three weekends weatherizing homes of elderly and lo-income McGehee residents.

Entergy also gave away 2000 fans to their low income customers to help them survive the summer without air conditioners. In partnership with the Arkansas Department of human Services in the “Piggyback Program” Entergy provided assistance over federal allocations to replace highly inefficient refrigerators, and other building repairs.

Similar projects were initiated in the other states. Entergy Louisiana volunteered at Energy Expos to explain energy conservation measures. Entergy New Orleans is also taking energy education to school children in the city’s low income

pockets. This education initiative is important to the community's future population since more than 40% of the city's children live below poverty level. In partnership with a non profit advocacy Via Link, Entergy New Orleans is taught to identify customers who are in need of assistance. In Texas, Project Care not only shows customers how to make their homes more energy efficient by also provides materials with which to do it.

"Support programs that help lower Energy bills are:

(1) Federal energy assistance (LIHEAP and WAP);

(2) Charitable assistance (e.g., contributions to fuel funds, volunteer projects to install weatherization measures and provide tax and budget counseling);

(3) Credit and collections policies and practices (e.g., Pick-a-Date, deferred payment agreements, customer charge waivers, late fee waivers); and

(4) Ratepayer- or publicly funded energy assistance."

29. Assessing Marketplace Methodologies for Understanding Consumer Values influencing Production Selection in Buildings and Other EERE Technologies

By the Oak Ridge National Laboratory for the Energy Efficiency and Renewable Program (EERE), U.S. Department of Energy, November 2002.

Contact Information: Barbara Ashdown
David Bjornstad
Melssa Lapsa
Rosalyn McKeown.

The focus of this study is on alternatives for understanding the relationship between consumer values and the attributes of EERE energy-efficient residential products, including construction options in building and weatherization, appliances, lighting, and on-site power generation." The results are based largely on assessment of publicly available marker research literature covering market segmentation for product selection; survey methodologies, including types of instruments, approaches to surveying, and cost/benefit analysis; and specific case studies that feature data analysis.

Based on "Dominant Satisfaction Themes" and "Eight Dimensions of Energy Innovation Adoption" the study came up with the following list of consumer values. Conservation and ethological ethic, social concern and responsibility ethic, affordability, financial security and risk, convenience, reliability, independence and self reliance, sensual quality and experiences, status, image and aesthetics and timing of entry into market.

The study makes the following conclusions:

1. EERE should undertake or sponsor more market research that can be published in the open literature or made available to the public, as well

as help update much of the peer-reviewed literature on market segmentation for energy-efficient products." With this it may be possible to assess some of the changes in consumer values.

2. All future market research should be targeted at those gaps in current market transformation and technology development, which address the difference between consumers' value and actual product availability.
3. Values that should be targeted are the willingness to pay, levels of information, attitudes, sensitivity to certain issues, and ethical/moral precepts.
4. Market segmentation of consumers is important so as to identify market penetration process at which certain groups are likely to "buy-in". This deals with demographic events.
5. Due to resource constraints, there has to be designed a certain trade-off between survey research that drives up the cost and research required to maintain survey validity.
6. A distinction should be made between single period and dynamic studies. Dynamic studies track market changes, and should be a serious.

30. "Seizing Opportunities with Energy Star for Existing Homes" - Home Performance with Energy Star.

By NYSERDA for RESNET Conference, February 25 2003.

Contact Information: Andrew Fisk.

The report presents the market barriers to applying Energy Star to existing homes and how they can be overcome. It underlines the provision of "house-as-a-system" program that delivers savings through quality. The program targets midstream market players such as builders, contractors, retailers, community based organizations and multifamily building owners. Energy Star, Building Performance Institute (BPI) and NYSBA labels can be attached to products.

The 2001 target area was Syracuse, Binghamton, Rochester and Buffalo. Marketing was done through TV, radio, print, consumer handouts, and contractor recruitment information. Incentives were provided to contractors and consumers in the form of training programs, low interest financing options, etc. The program targets to convert 10,500 homes by 2006, increasing the job value for energy star homes from 15 million (2002) to 70 million by 2006.

31. National Tax Policy Update: 108th Congress – Incentives for Energy Efficiency in Buildings and Equipment.

By the Natural Resources Defense Council (NRDC) for RESNET Conference, February 26 2003.

Contact Information: David B. Goldstein, dgoldstein@nrdc.org

The presentation is an update on federal tax incentives for energy efficiency in buildings and equipment. The policy reasons for 2003 tax incentives include high consumer energy cost, assured peak time power supply with price excursions and economic stimulus. It is claimed that the tax incentive "can actually generate revenue for the treasury".

This is possible when "performance-based incentives" are provided instead of "price-based incentives" Though more difficult to correctly specify, performance based incentives avoid market corruption, reduce/eliminate cost to treasury/consumer and leave an industry in a more advantageous position even after tax incentives are removed. It uses the *true* market competitiveness of the product forcing true innovation and volume-driven profits.

Tax incentives are recommended to be between 25% and 50%. This leverages treasury investment by 2-3 times. Tax incentives of 75-100% can be too much. They may provide the wrong market transformation, invite corruption, reduce economic stimulus and leave a weak market once the incentive is removed.

According to H.R. 4 tax deduction is provided for commercial buildings that save 50% with one-third the incentive available for each subsystem: envelope, lighting and HVAC. This also includes schools, public buildings and rental housing. Money can be raised for the treasury by reducing tax-deductible energy costs. HVAC equipment covered in H.R. 4 and Snowe-Feinstein Bill include covered air conditioners, water heaters, geothermal heat pumps and furnaces.

While existing homes is politically very attractive on implementation cost to the treasury is an issue. The Snowe-Feinstein bill provides $200 for 30% savings and $500 for 50% savings.

32. CHEERS - Increased Energy Code Performance through Home Energy Ratings (HERS)

By CHEERS for RESNET Conference, February 24 2003. 0304/Reference Mtls/Internet Downloads/Hamilton_providers.pdf

The report discusses the infrastructural issues for HERS providers. It listed the key market actors for the existing house market as homeowners, raters and software (vendors). Critical responsibilities that come with HERS include credibility and consistent availability of program trainer, quality assurance, and simple data management and information flow. A suggested method to achieve this is to maintain a password protected internet database and co-ordinate the program with the building department and other firms with similar programs.

33. The Rater View - Increased Energy Code Performance through Home Energy Ratings (HERS)

By CHEERS for RESNET Conference, February 24 2003.

This presentation represents the raters' viewpoint of increasing energy code performance through HERS. Their concerns include verification of their exact role and the present and future impact on their business. There is the need to differentiate between "verification and rating" of buildings.

Their responsibilities include working with the energy consultant, builder, installer and the local building department. Verification methods include reduced duct leakage, TXV, ACCA Manual D, duct location improvements, reduced building envelope air leakage, and duct surface area reduction.

34. Answers to Frequently Asked Questions about LEED for Existing Buildings

By LEED US Green Building Council (USGBC) August 18, 2002.

Contact Info:

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> Michael Arny, Co-Chair of LEED for EBC: 608-280-0255; LEED-EB@usgbc.org.
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> Peter Templeton, LEED Program Manager: 202-828-7422; ptempleton@usgbc.org.

LEED-EB provides the opportunity for owners and operators of all existing buildings to be recognized and certified in their efforts to realize the promise of sustainable operations and reduce the environmental impact of their buildings year after year, over the long term." This can be used for both pre-certified LEED buildings and buildings seeking new certification. The pilot program will be run from January 2002 to mid 2003. Participants are selected on the basis of applications submitted by building owners and operators. Buildings will be selected in the ascending order of required improvement." The three categories for this are, buildings that already operate on green principles, but need to now meet LEED-EB credits; buildings systems and infrastructure that meet LEED-EB requisites with some improvements in operational processes; and buildings that require significant retrofits and operational improvements that can be implemented within the time frame of the pilot program.

Participants need to pay a fee per building registered and have at least one representative attend the existing buildings orientation workshop. The goal is to

capture the policies building owners need to track in order to operate their buildings in a sustainable way.

35. Setting the Standard for Building Performance

By Building Performance Institute for RESNER Conference, February 25 2003.

The document presents Building Performance Institute's means to improve HERS rating and can be used as a critical analysis of the HERS program.

Standards are required by consumers, policy makers, authorities and practitioners to ensure consistent delivery and improved quality of services, to improve the bar and to obtain broad-base acceptance. This requires clearly defined and stated standards with a well-developed system for validation and verification to maintain quality.

Standards are divided into technical specifications, performance standards and policy standards. Technical specifications are end product oriented, quantifiable and goal-oriented, e.g. Energy Star labels. Prescriptive standards are measurable, verifiable, repeatable and often nominal. They include material and installation specifications, minimum measures, and acceptable limits. Performance standards are procedural, practical, applied and directly related to best practices. They include tools and techniques, diagnostic application, work scope prioritization and protocols and procedures. Validity standards look into quality, pass/fail conditions and are correlated to prescriptive and performance standards. They involve inspection, de-listing, feedback/recertification and compliance tools.

BPI certification is provided on the basis of a knowledge based written examination. Certifications are provided for shell, heating, AC/HP, mobile units and multiple units in particular. BPI combines a building analyst in one/more of the above fields with the HERS rater raising the bar for raters. This overcomes some of HERS currents shortcomings in technical performance standards, quality assurance standards and procedures, de-listing criteria and centralized technical support. The BPI HERS rater will also focus on the following aspects where national HERS raters fall short:

1. Insulation assessment procedures to determine effectiveness
2. Mechanical ventilation requirements
3. Duct leakage testing specifications
4. Combustion safety testing
5. Inspection process
6. Design requirements (Manual J, Manual D, IBR)

BPI also aims to provide guidance for working with builders and a homeowner's manual.

36. Success Stories – Austin Energy Green Building Program

By Building Performance Institute for RESNER Conference, February 25 2003.

Contact Information: Richard Morgan – 512-505-3709

The report presents highlights of the Austin's Green Building Program. Credits worth one to four stars were given for energy efficiency, water efficiency, building material conservation and solid waste reduction. The program lists more than 30 green building specifications. The Green Building Program is currently justified through electrical demand savings to the city-owned utility.

The program employs seven people and has an annual budget of $270,000. It serves the 500,000 residents of Austin. The program is managed by the City of Austin's Environmental and Conservation Services Department. Partnerships are formed with the Sustainable Building Coalition, the Center for Maximum Potential Building Systems, the Texas Capitol Area Builders Association, the American Institute for Learning, the Sierra Club, the Greater Austin Chamber of Commerce, Habitat for Humanity, Home Depot and others.

37. The Role of Building Technologies in Reducing and Controlling Peak Electricity Demand

Jonathon Koomey and Richard Brown, Energy Analysis Department, Environmental Energy Technologies Division, LBNL, Berkeley, CA. September 2002.

This paper describes policy-relevant issues that surround peak power demand. Many factors influence peak demand including weather, demographics, economic activity, equipment ownership, technology choice, usage behavior, designer/installer behavior, and government policies. Weather tends to be the most important driver of peak demand. For utilities in warmer regions of the U.S., peak demand is driven mainly by air conditioning loads on the hottest summer afternoons. Regarding government and utility programs, most policies that affect the efficiency of buildings and equipment can also influence peak demand, as can utility regulation regimes and the structure of utility tariffs. Equipment efficiency standards, building codes, voluntary programs, government procurement, and utility rebate programs all can have an effect in the short to medium term. Government research and development can have a longer-term effect on peak demand.

Categories and examples of strategies that can affect peak demand:

Load Reducing Strategies	High efficiency buildings & equipment
Load control glazings Daylighting Lighting and AC controls High albedo roofing materials Shading Efficient humidity control Behavioral changes (turning off the lights) Energy management systems Building commissioning Weatherization	Heating Cooling Lighting Heat pump water heaters Refrigeration Others Building commissioning Weatherization
On-site heat and electricity generation	Fuel switching to natural gas
Building integrated photovoltaics Fuel cells Microturbines Cogeneration Solar water heating Solar pool heating Passive/active solar space heating Geothermal heat pumps	Heating Cooling Water heating Cooking Clothes dryers
Load shifting strategies	
Energy management systems Waste heat recovery Appliance and water heater timers	

38. Policy Options for Improving the Efficiency of Existing Buildings: Experience to Date in the United States

Jennifer Thorne, ACEEE, Washington, DC.

Policies to Promote Efficiency Improvements in Existing Homes

Financing Programs for Efficiency Improvements

Financing programs are typically in the form of zero and low interest loans for energy efficiency improvements. To encourage larger-scale efficiency improvement, some states and utilities may offer additional buy-down of interest rates on larger loans. Since many private lending institutions are reluctant to process small loans (e.g., $2,000 or less), public agencies and specialty lenders with a mission to encourage efficiency investments, may finance these smaller accounts internally.

Tax Incentives for Efficiency Improvements

Previous experience in the U.S. demonstrates the difficulties in crafting effective tax credit programs for existing homes. From 1977 to 1985, the federal government offered tax credits for a number of standard residential energy efficiency measures. Studies suggest that the tax credit program suffered from high levels of free ridership and had relatively little impact on consumer behavior due to the small size of the credit, lack of promotion, and administrative burdens.

Residential Energy Conservation Ordinances and Weatherization Standards

"RECOs are designed to bring the existing housing stock up to a minimum standard of efficiency, which is generally much less stringent than that prescribed by codes for new construction. RECOs guarantee improvements in the efficiency of the existing housing stock (estimated energy savings up to 15%), provide residents and renters with a minimum level of home comfort and reduced energy bills, cost relatively little to administer, and maintain local jobs by supplying regular work for energy auditors, contractors, and others.

Local climate conditions determine the level of insulation required and whether water conservation measures are included. In many cases, cost ceilings set a limit on the cost of compliance either at a pre-determined dollar amount or as a percentage of the selling price or cost of renovation. Enforcement varies, but at a minimum requires inspection to verify compliance and issuance of a certificate of compliance. Additional enforcement mechanisms include required proof of compliance before the deed is recorded; regular re-certification by an energy inspector every few years; and, in the most sophisticated systems, tracking mechanisms that follow the process by issuing follow-up reminders to responsible parties, and prosecution for non-compliance."

Home Energy Ratings and Energy Mortgages

"Energy mortgages (EMs) work in concert with home energy ratings to provide consumers with mortgage incentives. Specifically, energy improvement mortgages (EIMs) provide financing for upgrading an existing home, and energy-efficient mortgages (EEMs) help consumers purchase energy-efficient homes by "stretching" the debt-to-equity ratio above maximum loan limits for qualifying energy-efficient homes. EMs operates under the assumption that homeowners with energy-efficient homes will pay lower monthly energy bills and, therefore, have additional resources to service slightly higher mortgage payments."

Policies to Promote Efficiency Improvements in Existing Commercial Buildings

Commercial Energy Conservation Ordinances

"Based on the success of their residential energy conservation ordinances, two communities – San Francisco, California and Berkeley, California – have enacted the nation's only commercial energy conservation ordinances (CECOs). Like RECOs, the commercial ordinances seek to improve the efficiency of commercial buildings by requiring implementation of specific, cost-effective efficiency measures at the time of title transfer, when significant building renovations are made (i.e., more than $50,000) or when additions increase a building's conditioned space by more than 10%.

Higher administrative costs, limited public awareness, and insufficient staff have hindered the ordinances' effectiveness. While CECOs have the potential to contribute significant energy savings and emissions reductions, additional efforts to simplify the ordinances and streamline their administration and enforcement are needed."

Energy Performance Benchmarking and the ENERGY STAR Buildings Label

"The Energy Star Building label recognizes the most energy-efficient commercial buildings in the country and motivates building owners and operators to improve the energy performance of their facilities. The voluntary program uses a performance-based rating system that allows building owners to compare the performance of their buildings to similar buildings in their region.

The EPA developed a set of tools to help building owners identify and schedule efficiency improvements and analyze the financial implications of various upgrade options. In addition, financial analysis software is available at no charge to help commercial real estate asset managers in determining how the efficiency upgrades can increase operating income, reduce vacancy rates, increase appraisal value, and otherwise affect their bottom line."

Conclusions:

Recommendations for combining the approaches presented into potentially more effective programs include:

- Adopt HERS as the basis for RECO compliance inspections or in lieu of loan program audit requirements. Basing RECOs and loan programs on a nationally recognized rating system may also make program development and administration easier.
- Expand the use of home energy ratings and building performance benchmarks and link with other energy efficiency financing.
- Offer financing to assist the parties subject to energy conservation ordinances or weatherization standards by linking with programs that sponsor low-interest loans and energy mortgages. This could encourage compliance and make the necessary efficiency improvements more affordable.

Major Advantages and Disadvantages of Policy Approaches

Approach	Advantages	Disadvantages
Residential financing programs	Cost-effective for larger jurisdictions; May offer greatest energy savings; Leverage greater private funds	Expensive to start and market; Requires extensive marketing and consumer education
Residential energy conservation ordinances	Low-cost to implement locally; Mandatory compliance	Small per household savings; Politically difficult to enact or enforce
Residential tax credits	Stimulate investment in large energy savings	Difficult to design effectively; Free rider issues; Expensive to administer
Home energy ratings and energy mortgages	Uniform approach for national or regional program; Leverage greater private funds; Large energy savings potential	High start-up costs for program infrastructure and marketing; Cost-effectiveness uncertain; May not be self-sustaining
Commercial energy conservation ordinances	Potential energy savings significant Mandatory compliance	Difficult to design and enforce; Politically challenging
Commercial energy performance bench-marking and labeling	Uniform approach for national program Easy for users and simple to implement; Recognition encourages participation	Requires extensive education and marketing; Energy savings uncertain