



**California Joint Utilities
Financing Research:
Existing Programs Review
CALMAC Study ID PGE0338.01**

April 22, 2014

**Pacific Gas and Electric, Southern California Edison,
Southern California Gas, and San Diego Gas & Electric**

The Cadmus Group, Inc.

An Employee-Owned Company • www.cadmusgroup.com

This page left blank.

Prepared by:
Laura James
Pat McGuckin
Althea Koburger
Carol Mulholland

Cadmus: Energy Services Division



This page left blank.

Table of Contents

EXECUTIVE SUMMARY	1
Key Findings.....	2
SUMMARY MATRICES	8
ANALYSIS.....	12
Introduction.....	12
Methodology	12
Findings.....	15
PROGRAM PROFILES	41
RESIDENTIAL and RESIDENTIAL/COMMERCIAL PROGRAMS.....	42
Clean Energy Works Oregon.....	42
Help My House Loan Pilot Program (KW Savings).....	50
HERO (Western Riverside Council of Governments).....	57
Illinois Energy Efficiency Loan Program.....	65
Keystone Home Energy Loan Program - Unsecured Financing	71
Mass Save HEAT Loan Program	79
Michigan Saves SM Home Energy Loan Program and Business Energy Financing Program	86
Midwest Energy How\$mart [®] On-Bill Financing.....	94
NYSERDA On-Bill Recovery Residential Financing Program	101
Windsor Efficiency PAYS.....	109
Power Smart [™] Residential Loan Program (Manitoba Hydro,Canada)	116
Green Deal Program	123
COMMERCIAL PROGRAMS	131
Small Business Energy Advantage (The United Illuminating Company).....	132
China Utility-based Energy Efficiency Finance Program (IFC)	138
Hungary Energy Efficiency Co-Financing Program (IFC)	145



Acronym	Definition
ARRA	American Recovery and Reinvestment Act of 2009
BBM	BetterBuildings for Michigan
BEF	Business Energy Financing
BPI	Building Performance Institute, Inc.
C&I	Commercial and Industrial
CEEF	Commercializing Energy-Efficiency Financing
CEEF	Connecticut Energy Efficiency Fund
CEWO	Clean Energy Works Oregon
CFL	Compact fluorescent light bulbs
CHUEE	China Utility-Based Energy Efficiency Finance Program
CJGNY	Green Jobs Green New York
CL&P	Connecticut Light & Power Company
DECC	Department of Energy & Climate Change
DEP	Department of Environmental Protection
ECO	Energy Company Obligation
ECSC	The Electric Cooperatives of South Carolina
EFS	Energy Finance Solutions
EM&V	Evaluation, Measurement, and Verification
ESCO	Energy service company
EUC	Energy Upgrade™ California
EVI	Economic Value Initiative
FAE	Forced air electric
FCU	Federal Credit Union
GDFC	Green Deal Financing Company
GEF	Global Environmental Facility
GHG	Greenhouse gas
HEECP	Hungarian Energy Efficiency Co-Financing Program
HELP	Home Energy Loan Program
HERO	Home Energy Renovation Opportunity
HERS	Home Energy Rating System
HMH	Help My House
HPwES	Home Performance with ENERGY STAR®
HPXML	Home Performance-Related Data Transfer
HVAC	Heating, ventilation, and air conditioning
IEG	Independent Evaluation Group
IFC	International Finance Corporation
IIP	Institute for Industrial Productivity
IOU	Investor-owned utility
LLR	Loan loss reserve
MSUFCU	Michigan State University Federal Credit Union
NGO	Non-Governmental Organization
OBF	On-bill financing

Acronym (cont'd.)	Definition
PACE	Property Assessed Clean Energy
PAYS	Pay As You Save
PG&E	Pacific Gas and Electric Company
PLC	Public limited company
QIV	Quality installation verification
RCPA	Regional Climate Protection Authority
REDLG	Rural Economic Development Loan and Grant
RFP	Request for proposal
RGGI	Regional Greenhouse Gas Initiative
RIA	Research Into Action, Inc.
RIM	Ratepayer impact measure
RUS	Rural Utility Service
SBEA	Small Business Energy Advantage
SCE	Southern California Edison Company
SCEIP	Sonoma County Energy Independence Program
SDG&E	San Diego Gas & Electric Company
SME	Small and medium enterprise
SoCalGas	Southern California Gas Company
TRC	Total resource cost
UCC	Uniform Commercial Code
UCT	Utility cost test
UI	United Illuminating Company
USDA	U.S. Department of Agriculture
WHEEL	Warehouse for Energy Efficiency Lending
WRCOG	Western Riverside Council of Governments



This page left blank.

EXECUTIVE SUMMARY

The California investor-owned utilities—Pacific Gas and Electric (PG&E), Southern California Edison (SCE), Southern California Gas (SoCalGas), and San Diego Gas & Electric (SDG&E), referred to collectively as the IOUs or Joint Utilities—are designing seven energy efficiency financing pilot programs at the California Public Utilities Commission’s (CPUC’s) direction. To help inform the pilot design process and subsequent evaluation efforts, the IOUs engaged Cadmus to conduct a comprehensive review of 15 existing financing programs representing noteworthy program models across the United States and around the globe. The work was commissioned in large part in order to help bring the evaluation, measurement, and verification (EM&V) staffs of the Joint Utilities up to speed in a rapid fashion with the current “best practices” observable in the marketplace, based on the emphasis being placed on the rapid roll-out of the pilots across California. The IOUs and Cadmus collaborated on selecting the programs to review and on establishing 10 subject areas for the research.

The 15 programs profiled in this document represent a broad range of program designs. Three programs—Western Riverside Council of Governments’ Home Energy Renovation Opportunity (HERO), Midwest Energy’s How\$mart, and Michigan Saves—offer both commercial and residential financing. The Chinese and Hungarian programs were planned for short duration and are now closed. The programs are listed in Table 1.

Table 1. Programs Reviewed

Residential Programs
<ul style="list-style-type: none"> • Clean Energy Works Oregon • Help My House (South Carolina) • HERO (Western Riverside Council of Governments, California) • Illinois On-Bill Finance (OBF) Program • Keystone Home Energy Loan Program (Pennsylvania) • Mass Save HEAT Loan • Michigan Saves Home Energy Loan Program • Midwest Energy How\$mart (Kansas) • NYSERDA On-Bill Recovery (New York) • Windsor Efficiency PAYS (California) • Green Deal (United Kingdom) • Power Smart Residential Loan Program (Manitoba, Canada)
Commercial Programs
<ul style="list-style-type: none"> • HERO (Western Riverside Council of Governments, California) • Michigan Saves Business Energy Financing • Midwest Energy How\$mart (Kansas) • United Illuminating Small Business Energy Advantage (Connecticut) • China Utility-based Energy Efficiency Program • Hungary Energy Efficiency Credit Fund



Cadmus and the IOUs selected the 10 subject areas for their specific relevance to the IOUs’ pilot programs (see Table 2).

Table 2. Subject Areas Researched

Subject Areas	
1. Program Results	6. Project Eligibility
2. Financing Offer	7. Contractor Network
3. Overlapping Programs	8. Process and Impact Evaluation
4. Borrower Eligibility	9. Program Cost-Effectiveness
5. Long-term Loan Performance	10. Keys to Success

In addition to reviewing each program’s website, Cadmus reviewed existing program documents, evaluations, policy reports, and other publicly available resources. With each program, we had questions that could not be answered with the publicly available sources. To fill in these gaps, we reached out via phone or e-mail and conducted interviews with staff from each of the 15 programs. We created a profile for each program and then analyzed our findings to identify common program features, typical obstacles and solutions, and keys to success. The key findings from our analysis are presented below.

Key Findings

Program Results

Various programs used different metrics to measure success. Most focused primarily on loan volume and total number of participants (see Figure 1 and Figure 2). Programs also monitored criteria such as energy savings, job creation, greenhouse gas emissions reduction, as well as other metrics, as secondary goals. The programs in China and Hungary are an exception to this, since their primary goal was to reduce greenhouse gas emissions. Program volume is impacted by market size, years in operation, target sector, and more. It is important to note that the volumes shown are not for the most recent year of operation. They are instead an average calculated by dividing the total number of projects by the years in operation. New programs often take time to ramp up, and the figures reflect that in general. The largest of the programs is also the oldest. The exception is the HERO Residential program, which is the second largest after only two years.

Figure 1. Average Projects per Year since Program Inception – Residential

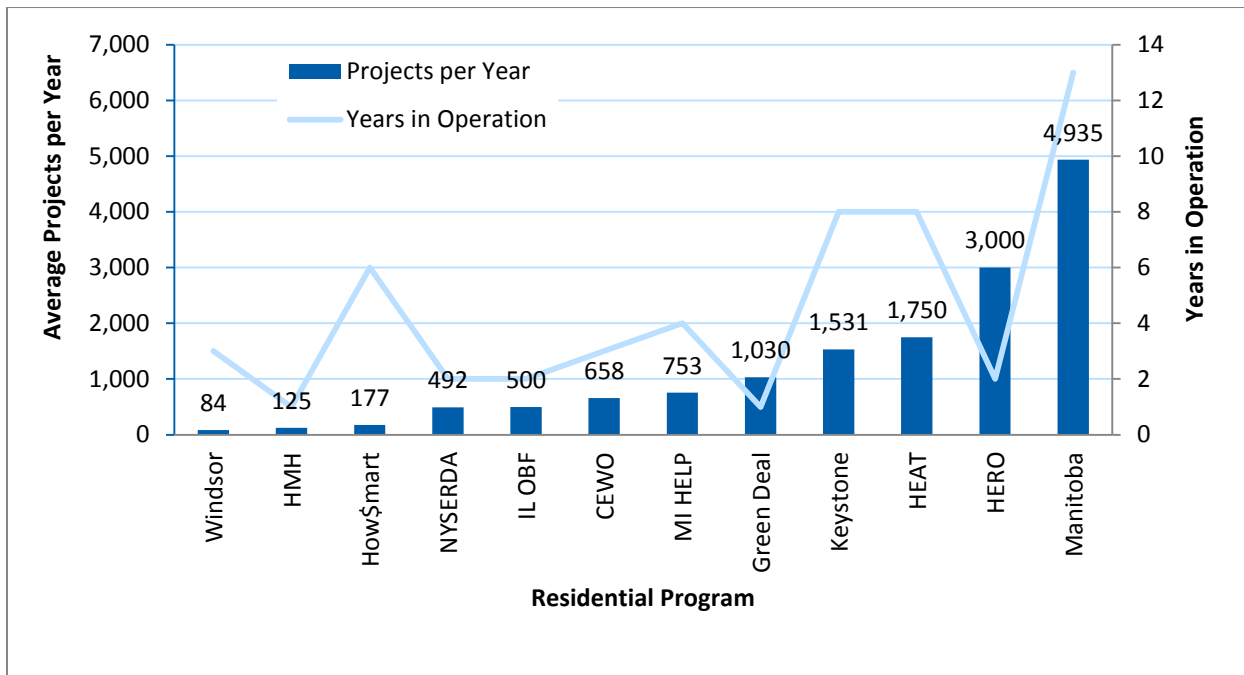
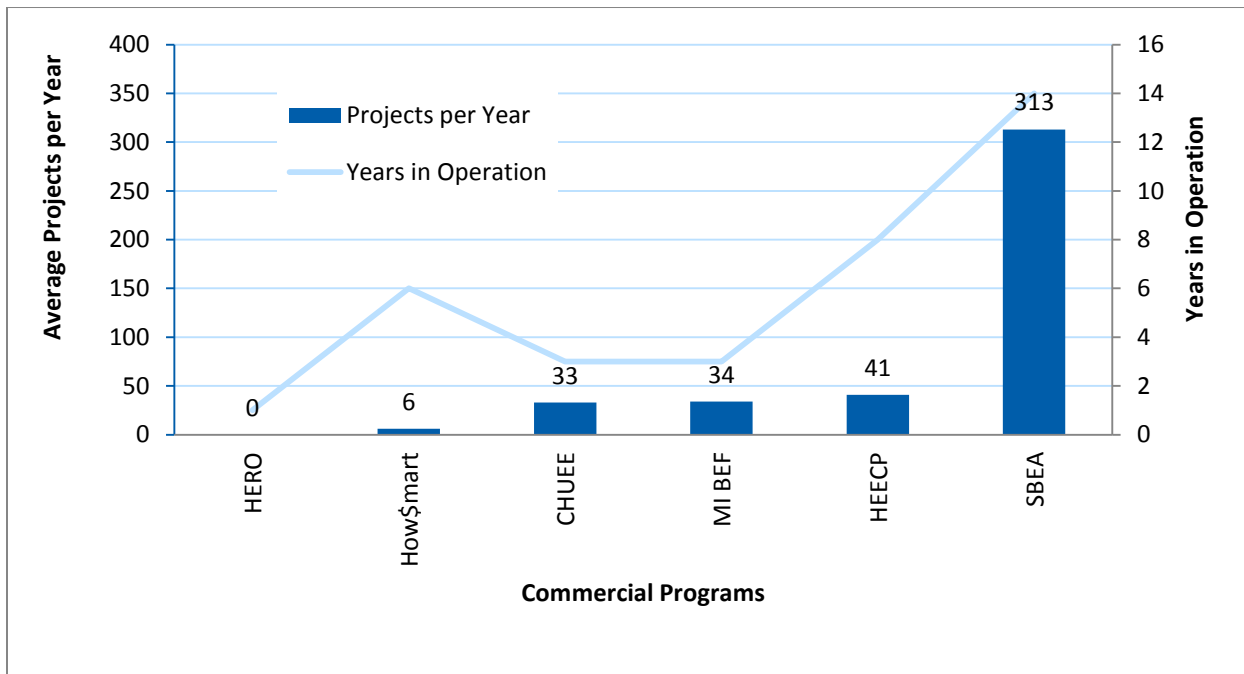


Figure 2. Average Projects per Year since Program Inception – Commercial¹



¹ HERO Commercial reported in late 2012 after one year in operation that they had over \$20 million in projects in the pipeline, but the first one was not yet complete.



Financing Offer

- Interest rates ranged from 0% to 9%. The most successful program, Manitoba Hydro’s Power Smart, is in the middle of the pack at 4.8%. Market-based rates do not appear to be a deterrent to success.
- The maximum loan tenor (i.e., the duration of a loan) ranged from four years to 25. Most programs were in the 10 to 15 years range. Deeper retrofits tend to have longer payback periods, so longer tenors are often necessary in order to reduce the size of the monthly loan payments and allow for positive or neutral cash flow (i.e., the average energy savings exceed or are equal to the loan payments).
- Maximum loan amounts varied widely. On the residential side, the maximum varied from \$2,500 (Windsor PAYS) to \$200,000 (HERO PACE). Commercial maximum loan amounts ranged from \$100,000 to \$600,000, and two of the international programs – China and Hungary – had no maximums. On the residential side, larger maximum loan amounts correlated to larger average loan sizes.
- Commercial loan programs are not necessarily more complex than residential loan programs, but they are more diverse. Programs ranged from supporting multi-million dollar retrofits with complicated underwriting requirements to single-measure equipment upgrades underwritten based on the customer’s utility bill payment history. For Midwest Energy’s How\$mart in particular, there are only slight variations between the residential and commercial programs.
- Loan loss reserves (LLRs) have been a popular tool to push financing markets to offer more options for energy efficiency retrofits, by reducing the risk to lenders associated with learning a new and evolving market. LLRs may be achieving their goal. Clean Energy Works Oregon (CEWO) reached an agreement with its lenders to dissolve the LLR as of January 1, 2014. All lenders agreed to continue to offer special financing for program participants, with the same rates and tenors as when the LLR was in place. It will be interesting to track how the financial offerings evolve over the next few years.

Overlapping Programs

- Most program managers believed they had better results from offering both financing and rebates than either alone. For instance, participation in United Illuminating’s Small Business Energy Advantage (SBEA) program dropped to zero when the rebate funding briefly ran out. Once monies were replenished and rebates were resumed, the uptake returned. In addition to increasing overall participation, financing may benefit programs by helping customers take on larger projects than they would have without financing. Michigan Saves found that projects that took advantage of both rebates and financing were twice as large as projects without financing.

Borrower Eligibility

- Programs with lower minimum credit scores, structured to be available to those with less robust credit, nevertheless appear to primarily serve customers with higher credit scores. The average FICO credit score for both Michigan Saves’ HELP and NYSERDA’s on-bill program participants is

approximately 750, though the minimum accepted score ranges from 640-680. This gap does not appear to be the result of a lack of demand from people with worse credit. Roughly 40% of Michigan Saves applicants are denied, many for credit scores below the minimum requirement or for having insufficient income to cover additional debt. This finding is important in relation to the California pilots since an expressed goal of the pilots is to structure the offerings to be accessible to mid to low income customers as well as attractive for the involved financial institutions.

Long-Term Loan Performance

- Default rates across all programs were very low. Despite different loan terms and underwriting criteria, default rates were consistently reported as being around 1% or less.

Eligibility of Measures and Projects

- Financing programs are generally not subject to the same cost effectiveness and evaluation rigor as rebate programs, which may afford program managers greater flexibility. In Manitoba, for instance, the legislature mandated that all new furnaces sold through retail markets be high efficiency (AFUE 92 or better). As a result, the baseline efficiency was so high that rebates on furnaces could not be made cost-effective. However, the financing program is not subject to cost-effectiveness tests and can still help customers manage the upfront cost of high-efficiency furnaces.
- Audits are not necessarily required to achieve deep retrofits. The HERO program has the largest average loan size of the residential programs reviewed and relies on prescriptive measures rather than requiring audits.

Contractor Network

- Managers of nearly all programs believed that the contractors' role as a sales channel was critical to customer uptake. The Mass Save HEAT Loan was an exception. HEAT program staff reported that most leads come through their website or call center, and are then distributed to contractors for follow-up and fulfillment.

Process and Impact Evaluation

- None of the programs we reviewed have evaluated the relative and incremental impact of financing versus the offering of only traditional rebates. The HEAT program sponsors (the Massachusetts IOUs) are required by their regulators to evaluate how HEAT loans affect other programs. Cadmus will conduct this evaluation for National Grid but the project has not yet started.

Program Cost-Effectiveness

- None of the programs formally evaluate freeridership, spillover, or cost-effectiveness. HowSmart program managers believe the program minimizes freeridership by requiring that the most cost-effective measures be included in each project.



Keys to Success

- When asked about best practices and lessons learned, no two programs gave similar answers. While our analysis revealed a number of keys to success, the wide variety of program types makes it difficult to identify industry-wide best practices.
- Credit enhancement is a key tool for initially attracting lender interest. Once lenders are engaged in a successful program, however, they may accept a reduction or elimination of the enhancement. CEWO has eliminated its LLR; MI HELP has increased its leverage over time; and HEECP reduced its loan guarantee from 50% to 35% while increasing participation.
- In SBEA's turn-key program, customers have to do "virtually nothing", an important feature for busy business owners.
- With a tariff model, UCC filings are needed to ensure that property buyers are notified of the tariff obligation.
- Streamlining the process keeps costs down and increases interest from customers and contractors.
- Manitoba Hydro and Windsor PAYS report that the required level of customer service is very high. Manitoba Hydro has reduced costs by streamlining its program, but customer service remains expensive.
- Keystone HELP and Michigan Saves HELP both found that very low interest rates were effective but unnecessary, and both decided that program funds were better spent on cash incentives. On the other hand, SBEA and HEAT have had remarkable success with 0% financing.
- NYSERDA is streamlining by automating project and loan approval. It also hopes to automate data collection with the Building Performance Institute's new Home Performance-Related Data Transfer (XML).
- SBEA nearly doubled program uptake by doubling the maximum loan tenor from 24 months to 48 in order to reduce monthly loan payment size. Many projects had previously not been able to meet the program's bill neutrality² requirement.
- NYSERDA's OBR program is considering a *pari passu*³ approach to partial loan payment in order to provide secondary market investors with greater security.
- China found that the lender partner that marketed to existing customers fared much better than the lender partner that tried to draw in new business by promoting the loan guarantee.

² Bill neutrality refers to a requirement that the average monthly energy savings are sufficient to cover the cost of the loan payments.

³ Instead of applying partial payments to the utility charges first, the payments would be applied proportionally to both the utility charges and the loan charges.

Additional Comments

- Program design is dramatically impacted by the kind of transaction—reactive or proactive—being targeted. Reactive transactions are driven by an urgent need to replace equipment, such as an air conditioner, that has failed. Proactive transactions are driven by a desire to act that is seldom urgent. The choice of contractor network, minimum and maximum loan amount, interest rate, loan tenor, evaluation method, and other variables for a program that targets reactive transactions may be very different than for a program targeting proactive customers.
- Program integration (i.e., across rebate offerings and financing opportunities) will have a major impact on the overall energy efficiency success derived. The scope of the research presented here was focused primarily on the design of the financing option itself, rather than looking at how to best integrate financing into existing program infrastructures. Integration will be key to attracting private financial institutions to the pilots. For more background on program integration, see ACEEE’s “New Lessons on Driving Demand for Energy Efficiency Financing” (2014) at www.aceee.org/sites/default/files/publications/researchreports/f1401.pdf. Research into the integration strategies of the top three or four most successful programs may be worthwhile.
- In the post-ARRA world, the pace of new development in energy efficiency program design may be slowing down, although typical bellwether states such as California, New York, Massachusetts, and Illinois continue to lead with evolving strategies. In contrast, financing program evaluation has been slow to develop but now seems poised to accelerate. Program administrators are anticipating the need to measure the impact of these programs and their cost-effectiveness relative to traditional incentive programs.
- The HERO Residential program has grown rapidly in two years to include 55 California communities in 6 counties and expects to add 55 communities in 10 more counties in 2014. In February, 2014, the program announced that \$104 million in AA-rated bonds were issued, secured by 5,890 PACE assessments levied on 5,627 properties located in Riverside County. The average assessment is \$18,273. Developments are being followed closely.