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NATIONAL ENERGY EFFICIENCY BEST PRACTICES STUDY

VOLUME R5 – RESIDENTIAL MULTI-FAMILY COMPREHENSIVE BEST PRACTICES REPORT

Submitted to

California Best Practices Project Advisory Committee
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ES. EXECUTIVE SUMMARY FOR RESIDENTIAL MULTI-FAMILY PROGRAM AREA (R5)

ES.1 INTRODUCTION

This volume presents results of a comparative analysis of residential multi-family comprehensive programs included in the National Energy Efficiency Best Practices Study ("Best Practices Study"). The overall Best Practices Study objectives, scope and methodology are briefly outlined in Appendix R5A of this report. More details on methods and cross-program findings are provided in separate report volumes.

The Best Practices Study team ("Best Practices Team") reviewed six residential multi-family comprehensive programs for this program area study ("R5 Programs" and "R5 Study," respectively), each of which had the goal of improving the overall efficiency of multi-family buildings, typically defined as having more than four units of housing. Multi-family programs are similar to their single-family comprehensive program counterparts (addressed in Best Practices Volume R4) in that they are designed to improve the overall efficiency of housing, but often must also address concerns related to equity and income, as well as higher potential barriers to participation. Like most comprehensive single-family efforts, these multi-family programs are primarily focused on resource acquisition – achieving a certain level of cost-effective kWh savings through the installation of specific measures. Typically, the cost-effectiveness of individual measures is determined measure by measure, with the most cost-effective being eligible for rebates, incentives or loans through the program.

As programs were identified and staff contacted, it became clear that multi-family comprehensive programs were less common and less evaluated than their single-family counterparts. Many of the multi-family programs in existence are add-ons to single-family programs, managed and implemented in similar ways (with sometimes different incentive structures), making it difficult to pull out the specific best practices that apply to the multi-family components of these programs alone. The dearth of multi-family programs may reflect to some extent the fact that the multi-family sector as a whole has long been considered "hard-to-reach."

The R5 Programs are listed in Exhibit R5-E1 below and presented in the body of this report. A discussion of the program selection process is provided in Appendix R5A.

ES.2 KEY CATEGORY THEMES

Four key crosscutting issues that affect multiple program components were identified for the R5 Programs.

There are major barriers related to financing, split incentives and transaction costs in the multi-family sector. The impact of split financial incentives between landlords and tenants is the most often cited primary barrier to increased efficiency in multi-family buildings. Residents are viewed as unlikely to invest in improvements to property that they do not own. Owners (many of whom are not responsible for paying directly for the energy used by their buildings) are often reluctant to spend money on improvements that offer them no tangible, financial

benefits. While split incentives can represent a daunting barrier to efficiency investment, other barriers (including access to financing and high transaction costs) can also impede program progress. The R5 Programs used a variety of tactics to overcome these barriers, the most common of which was offering incentives to reduce the financial impact of efficiency investments on property owners and directly installing unit-level measures free of charge.

The complexity of multi-family buildings creates technical barriers. The multiple types of buildings represented in the multi-family sector make it difficult for installers to have the expertise to confidently assess and address all related issues. Generalizing the experience and understanding of one building type with that of a very different one can be difficult. Ultimately these technical barriers can affect the accuracy of estimates and create health and safety concerns. The R5 Programs addressed the uncertainty resulting from these technical barriers through inspections, contractor expertise and on-going attention to emerging technical information.

Multi-family programs often emerge from concerns about equity and the impact of rising energy costs on those with limited or fixed incomes – particularly in the hard-to-reach (HTR) multi-family sector. Energy costs can represent a high proportion of total household income for multi-family residents. The R5 Programs addressed equity concerns through lower co-pays for program participants, by accepting higher transaction costs, and by providing additional project management services than might be provided in a rebate-driven single-family program.

Complex implementation structures are not uncommon. Multi-family programs may be supported by multiple funding sources and require the cooperation of multiple program implementers. They can be implemented independent of utility operations or through cooperative arrangements between utilities and local governments, community development corporations, community action organizations, or even the federal government. There are pros and cons to these less-traditional implementation structures. They can be more complex than standard utility programs, making them more difficult to coordinate. But they are also capable of bringing multiple actors together to deliver a more comprehensive program than one organization alone could. This theme is evident in the presence of subcontracts to government entities, cooperation with and outreach to community development corporations, and through the overlap between multi-family programs generally and their low-income program counterparts. The R5 Programs were, for the most part, utility-administered, however several included cooperative efforts with community development corporations and government agencies to identify potential participant buildings and/or offer additional services for low-income residents.

ES.3 BEST PRACTICES SUMMARY

Best practices are identified in the R5 Study for each of the four major program components used to organize data collection and analysis. These program components are Program Design (including program theory), Program Management (including project management, reporting and tracking, and quality control and verification), Program Implementation (including participation process and marketing and outreach) and Program Evaluation. Best practices were developed by analyzing information across programs developed from detailed interviews of program managers and thorough review of all relevant secondary sources such as program filings and evaluations. Exhibit R5-E2 presents the list of best practices developed from the

analysis of R5 Programs. Exhibit R5-E3 provides the rationales associated with each best practice. The remainder of this report provides detailed analysis and discussion of program features and best practice rationales.

The scope of this study also includes a California gap analysis. A comparison of the best practices presented in this report with the practices employed in California's Statewide Multi-Family Program is in progress and will be published in a separate document when complete.

Exhibit R5-E1
R5 Programs: Residential Multi-Family Comprehensive Programs Reviewed For R5 Study

Program Name	Implementer/s	Abbreviation for R5 Report
2002 Multi-Family Incentive Program	Austin Energy	Austin Multi-Family
2002 California Statewide Multi-Family Program	Pacific Gas and Electric Company (PG&E), Southern California Edison (SCE), Southern California Gas Company (SCG), and San Diego Gas & Electric Company (SDG&E)	CA SW Multi-Family
2003 Home Energy Savings Program - Multi-Family Component	The City of Portland/Energy Trust of Oregon, Inc. (Energy Trust)	Home Energy Savings Multi-Family
2002-2003 Apartment & Condo Efficiency Services	Focus on Energy™/Wisconsin Energy Conservation Corporation (WECC)	Focus on Energy Apt & Condo
2002 EnergyWise - Multi-Family Component	National Grid	EnergyWise Multi-Family
2000 Multi-Family Conservation Program	Seattle City Light (SCL)	Seattle Multi-Family

Exhibit R5-E2
Summary List of Best Practices for Multi-Family Programs

Program Theory and Design
• Have a sound program plan and clearly articulated program theory which describe the program logic, niche, resources and ultimate goal • Understand the financial and ownership structure of the local multi-family market and the relationships among the various market actors • Include societal and non-energy benefits in cost-effectiveness calculations • Tailor multi-family programs to the unique needs of the sector
Program Management: Project Management
• Develop and retain institutional knowledge of the multi-family building sector and lessons learned as implementation structures shift over time • Set reasonable, accurate expectations for energy savings and measure performance • Tailor project roles to the unique strengths of each implementation organization
Program Management: Reporting and Tracking
• Base reporting and tracking system design on how information will be used and data needs unique to multi-family programs • Assure that tracking systems are intuitive, straightforward, integrated and comprehensive • Develop systems for long-term strategy and use • Track the key components of multi-family buildings and program participation
Program Management: Quality Control and Verification
• Base quality control practices on a program's vendor relationships, measure types, and project volume • Conduct quality assurance and verification inspections to improve the overall understanding of how multi-family buildings function • Govern post-inspection levels by cost-effectiveness as well as quality assurance considerations • Conduct inspections in a timely manner • Use product specifications in program requirements and guidelines
Program Implementation: Participation Process
• Offer a single point of contact for customers • Offer an attractive mix of eligible measures and integrated program services that include potential program drivers, but tie rebates for the most popular measures to those less likely to be considered and installed • Use a whole-building approach to achieve maximum energy savings • Provide support to building owners throughout the process

Exhibit R5-E2
Summary List of Best Practices for Multi-Family Programs (Continued)

Program Implementation: Marketing and Outreach
• Develop and use a database or other method of tracking the population of multi-family properties and conduct periodic market assessments to update the information • Work with property owners and other market participants to help them succeed according to their objectives, and promote program benefits that align with these objectives • Build relationships with the maintenance and equipment firms responsible for system operations and maintenance • Showcase properties that have completed program upgrades
Program Evaluation
• Use evaluation to assure that energy savings meet expectations and that participants are satisfied with installed measures • Produce a basic report describing program activities, budget and expenditures, estimated savings and lessons learned for un-evaluated program years • Conduct evaluation at the most comprehensive level possible given time and budget constraints • Include estimation of free-ridership and spillover • Use baseline or market characterization studies to inform the program scope and measure mix selected

Exhibit R5-E3
Summary of Residential Multi-Family Comprehensive Programs Best Practices Rationale

Best Practice	Rationale
Program Theory and Design	
Have a sound program plan and clearly articulated program theory which describe the program logic, niche, resources and ultimate goal	A clear statement of program theory and/or program logic makes explicit the underlying assumptions of a program, including what it is expected to accomplish and potential indicators of success. When the underlying assumptions are well understood, those involved in program implementation and delivery are more likely to have a clear understanding of why certain measures are advocated or included. This can lead to quicker identification of program improvements and a better ability to recognize issues related to program success – one component of adaptive management.
Understand the financial and ownership structure of the local multi-family market and the relationships among the various market actors	For multi-family programs, understanding the overarching financial structure within which the sector operates is critical. Working with those likely to be present at the point at which decisions about system upgrade or replacement are made will increase the likelihood of capturing lost opportunities. In multi-family programs these actors may be similar to those targeted in commercial programs and include maintenance contractors, property managers and equipment vendors.
Include societal and non-energy benefits in cost-effectiveness calculations	Non-energy effects can help improve program cost-effectiveness. These benefits and the related program goals should be clearly stated in program plans. To gain support for these programs, include societal and non-energy benefits in cost-effectiveness calculations. Including these benefits can offset the higher costs of working in this sector. If equity is an underlying goal, state this clearly.
Tailor multi-family programs to the unique needs of the sector	Rather than offering a simple add-on to a single-family program component, design program activities to address the specific barriers related to multi-family buildings. Developing on-going relationships with multi-family property owners is important in overcoming these barriers and influencing investment at the point of system replacement.
Program Management: Project Management	
Develop and retain institutional knowledge of the multi-family building sector and lessons learned as implementation structures shift over time	Even in areas where the implementation structure changed significantly, successful programs tapped into the existing expertise and market relationships of previous programs. Retaining and leveraging the institutional knowledge in the program delivery network might mean using the same implementation subcontractor, reaching out to the existing network of trade allies or making program changes gradually.

Best Practice	Rationale
Set reasonable, accurate expectations for energy savings and measure performance	Continued program success in the multi-family sector depends ultimately on satisfaction with measures installed and trust in those delivering the program. Accurate information aligns expectations and outcomes, increasing the likelihood of ultimately satisfied participants.
Tailor project roles to the unique strengths of each implementation organization	The most effective marketing organization may not be the best direct service provider and vice versa. Flexibility in implementation will increase the likelihood that the players involved in program delivery offer the best level of service by allowing the appropriate mixture of utility, non-profit, governmental and for-profit players.
Program Management: Reporting and Tracking	
Base reporting and tracking system design on how information will be used and data needs unique to multi-family programs	Information systems should reflect business processes. Improving basic program operation, the quality of service provided, accountability, organizational decision-making and evaluation are some of the many reasons for these systems. Investments in data tracking should improve one or more of these areas. For multi-family programs, the number of units treated per building should be tracked as well as the number of total buildings. In cases where billing analysis is desired, account numbers and meter numbers for both the building and the unit should be tracked.
Assure that tracking systems are intuitive, straightforward, integrated and comprehensive	Cumbersome or overly complex systems cause program staff to develop "work-around" solutions and duplicate systems to track information they will be held accountable for. While individual solutions developed by program staff may be adequate to meet their own needs, they reduce overall confidence in the primary tracking system. When multiple tracking documents and processes exist, it is difficult to determine accuracy if they conflict.
Develop systems for long-term strategy and use	Several of the utility R5 Programs and their predecessors had been running for more than a decade. Stable, comprehensive systems can provide information and profile buildings for future program efforts that could include replacement offers at the end of measure life, or provision of information on emerging efficiency opportunities that may prove cost-effective in the future.
Track the key components of multi-family buildings and program participation	Tracking all aspects of multi-family buildings (including unit and complex level data) helps assure that all cost-effective measures have been considered for a participating building. Similarly, the high turn-over of residents, the variety of building ownership arrangements and the number of units per complex also present valuable descriptions of the market and help assess the remaining opportunities for energy and demand savings. For example, it may be necessary to track both the number of participating buildings or complexes and the number of individual units treated to get a sense of the true penetration of the program, as well as to assure that the untreated units are reachable later. Similarly, tracking the locations where only common area lighting was installed offers a logical place to start when targeting buildings for unit-level improvements.

Best Practice	Rationale
Program Management: Quality Control and Verification	
Base quality control practices on a program's vendor relationships, measure types and project volume	Standard measures installed by known vendors are likely to need less rigorous quality control and verification than higher risk measures (e.g., those with potential impacts on indoor air quality, or those that represent more cutting-edge technology, like EMS systems).
Conduct quality assurance and verification inspections to improve the overall understanding of how multi-family buildings function	Assuring that measures are installed and operating as expected is particularly important in multi-family buildings given the relative complexity and need for information about what works and doesn't work in different climates, in various building types and with different measure mixes.
Govern post-inspection levels by cost-effectiveness as well as quality assurance considerations	Multi-family projects can be large and have long timelines. Inspecting 100% of jobs is unlikely to be cost-effective, particularly for high volume programs with small impacts per site. A good rule of thumb is 10-30% for small projects and 100% for large projects and problem vendors. When planning for inspection: • Obtain a good random sample representative of all vendors and measure types; • Consider inspecting the first few jobs submitted by a new vendor; • Periodically assess results of inspections to determine if adjustments are needed; • Only tolerate a 100% post-inspection for "problem" vendors on a temporary, probationary basis; and • Use a contractor screening or certification process to encourage the participation of responsible contractors and high-quality installations.
Conduct inspections in a timely manner	Real-time feedback from inspections can uncover problems that can then be corrected in the same program year. Evaluation can detect the same problems, but is generally performed too late to enable course correction mid-program.
Use product specifications in program requirements and guidelines	Contractors should explain all product warranties to their customers and be prepared to respond to incidents of product failure. Requiring contractors to repair and/or replace products that fail before warranty expiration will help assure that contractors use high-quality products and stand by the performance of the products they install.
Program Implementation: Participation Process	
Offer a single point of contact for customers	Multi-family projects, particularly those involving complex system upgrades or long timelines, benefit from having a consistent single point of contact for busy property owners. In many ways, the idea of a single point of contact is similar to the service provided to large utility customers who may have a relationship with their utility representative.

Best Practice	Rationale
Offer an attractive mix of eligible measures and integrated program services that include potential program drivers, but tie rebates for the most popular measures to those less likely to be considered and installed	Program staff in Seattle and Portland acknowledged that rebates for windows were the primary measure of interest to owners. (Building owners are very interested in window upgrades, seeing them as something that can improve their property values.) Seattle Multi-Family and Home Energy Savings Multi-Family leveraged that interest by only rebating windows if all other cost-effective measures had been considered and installed. A note of caution is warranted however: Programs that use this strategy will need to avoid over-paying for measures that come to dominate the market.
Use a whole-building approach to achieve maximum energy savings	Approaching the building as a system allows auditors, project managers and contractors to consider the complex interactions of HVAC and air flow, windows and mechanical systems, and shell issues with air change per hour (ACH) requirements. However, this approach may require more time and hands-on project management. Programs managers interested in pursuing this approach will need to budget for the additional time and expertise required to integrate building systems, model the impact of upgrades and install the measures.
Provide support to building owners throughout the process	Given the high barriers to multi-family retrofit, every effort should be made to assure that owners are given adequate and accurate information throughout the project. Offering a review by a neutral party such as a program consultant or representative can offer credibility to contractor proposals and assure that measures are logical and appropriate.
Program Implementation: Marketing and Outreach	
Develop and use a database or other method of tracking the population of multi-family properties and conduct periodic market assessments to update the information	Multi-family building populations can be difficult to identify, even with utility customer information systems. Developing a population frame, though difficult, provides multiple benefits both in terms of target marketing and tracking program penetration over time. In conducting this research, programs should rely as much as possible on tax records, permit applications, or other existing sources to reduce the overall cost to develop the information.
Work with the property owners and other market participants to help them succeed according to their objectives, and promote program benefits that align with these objectives	Aligning the program activities with the goals of the market participants may mean helping them market their services, providing advanced training, helping improve property values for building owners or any number of strategies to entice participation. In its marketing material, Seattle City Light lists six benefits of program participation, only one of which concerns electricity consumption. The other benefits listed with program information include increased property value, reduced tenant turn-over, increased tenant comfort, reduced maintenance and reduced outdoor noise.
Build relationships with the maintenance and equipment firms responsible for system operations and maintenance	These firms are likely to be involved in the decision-making process at the point of system upgrade or replacement and are uniquely positioned to provide information about options to building owners or others responsible for capital decisions. If they are aware of the program and trust that it will continue to be available they are more likely to search out information on energy efficiency at critical customer purchase points.

Best Practice	Rationale
Showcase properties that have completed program upgrades	Identifying and promoting properties with completed program upgrades can help potential residents choose more efficient buildings and can improve the overall economic value of participation for property owners.
Program Evaluation	
Use evaluation to assure that energy savings meet expectations and that participants are satisfied with installed measures	The critical value offered by evaluation is the opportunity for feedback on and analysis of program strengths and weaknesses. Successful programs incorporate the results of evaluation in a paradigm of continuous improvement.
Produce a basic report document describing program activities, budget and expenditures, estimated savings and lessons learned for un-evaluated program years	This document can offer general information on program activities and milestones to stakeholders and other interested parties. Most of the R5 Programs produced some kind of annual report, however the level of detail varied widely and the programs were often described in combined budget line items that did not reflect functional separation (e.g., combining multi-family and single-family budgets).
Conduct evaluation at the most comprehensive level possible given time and budget constraints	Process evaluations are important for programs in their early years and for those in transition. Impact evaluations are important for all programs, and should be conducted frequently enough to assure savings are being delivered and other program goals are being met.
Include estimation of free-ridership and spillover	Determining the level of free-ridership and spillover can be challenging, but is valuable because of the insight it offers to program cost-effectiveness and the role of the program in the market.
Use baseline or market characterization studies to inform the program scope and measure mix selected	The multi-family market is a complex mix of building sizes, types and ages. Programs informed by the actual characteristics of the market can better target program resources and assure that the market needs the products and services promoted by the program.

1. OVERVIEW OF REVIEWED PROGRAMS

The R5 programs focused on improving the overall efficiency of multi-family buildings. The programs all offered a range of incentives, free measures and low-cost financing designed to reduce the incremental cost associated with efficiency improvements. The following briefly introduces each program.

The 2002 Multi-Family Incentive Program implemented by Austin Energy (Austin Multi-Family) targeted owners, developers and managers of multi-family properties by providing rebates for making energy-efficiency improvements. Predecessor programs were offered by this municipal utility beginning in 1988. In Program Year (PY) 2002, 5,020 apartment units in 31 projects participated by installing program qualifying energy improvements that saved over three million kWh.

The 2002 California Statewide Multi-Family Energy Efficiency Rebate Program (CA SW Multi-Family) was implemented by California's four largest investor-owned utilities (IOUs): Pacific Gas and Electric Company (PG&E), Southern California Edison (SCE), Southern California Gas Company (SCG), and San Diego Gas & Electric Company (SDG&E). It targeted multi-family property managers and owners through direct contact. The program offered rebates for a variety of energy saving upgrades to appliances and building systems, including gas measures. 2002 was the first year of a new statewide effort to target multi-family properties directly and was implemented by each of the IOUs using a uniform set of program guidelines and incentive levels. In 2002, 901 buildings participated in the program.

The 2003 Home Energy Savings Program - Multi-Family Component implemented by The City of Portland and the Energy Trust of Oregon (Home Energy Savings Multi-Family) targeted multi-family property owners and sought to identify equipment or building retrofits with energy savings potential. PY 2003 represents the first year of funding under the Energy Trust of Oregon, a non-profit organization established to invest public purpose funding in energy efficiency and renewable resources. The program was implemented jointly by the City of Portland's Office of Sustainable Development (formerly known as the Energy Office) and Energy Trust subcontractor Ecos Consulting. The City of Portland has offered multi-family energy efficiency programs for many years. In PY 2003 (May-December 2003), the program had 2,911 units committed to the program and included natural gas measures. Thirty-one projects comprising 706 units were completed by December 31, 2003.

The 2002-2003 Apartment and Condo Efficiency Services implemented by Focus on Energy and WECC (Focus on Energy Apt & Condo) targeted the owners and/or managers of apartment or condominium properties with four or more units. WECC managed the residential portfolio of Focus on Energy programs in Wisconsin, including this one. In PY 2002-03, 1,900 suggested electric and gas efficiency measures were installed in 1,900 participating buildings. An additional 570 customers received assessments, but did not complete installation by the end of the program year.

The 2002 EnergyWise Program – Multi-Family Component implemented by National Grid (EnergyWise Multi-Family) targeted multi-family buildings through contact with building

owners and managers. EnergyWise Multi-Family was modeled after National Grid's previous multi-family retrofit programs which were implemented by turnkey contractors in the service territories of IOUs Massachusetts Electric Company and Nantucket Electric Company since 1998. The program had both single- and multi-family components. In PY 2002, EnergyWise Multi-Family had 3,514 participating units.

The 2000 Multi-Family Conservation Program implemented by Seattle City Light (Seattle Multi-Family) targeted owners of properties with more than five units by offering technical assistance and rebates for a variety of energy-saving measures. Multi-family programs have been offered by Seattle's municipal utility for almost 20 years. The program was implemented in-house using pre-qualified contractors for installation. In PY 2000, projects in 74 buildings representing 1,114 units were completed (additional projects were contracted but not completed).

Specific program characteristics are noted in the Exhibit R5-1 below.

Exhibit R5-1
Summary of R5 Program Characteristics

	Austin Multi-Family	2002 CA SW Multi-Family	Home Energy Savings Multi-Family	Focus On Energy Apt & Condo	EnergyWise Multi-Family	Seattle Multi-Family
Period Reviewed	Jan – Dec 2002	Jan – Dec 2002	July – Dec 2003[1]	Sept 2002 – Aug 2003	Jan – Dec 2002	Jan – Dec 2000
Average retail electrcity price ($ per kWh)	$.08	$.135	$.07	$.085	$.109	$.082
Program Budget	$581,300	$8,304,000	$1,000,000[2]	$5,051,000	$2,255,000	$1,167,000
Total Incentives Paid	$423,700	$3,864,000	$239,530[3] ($750,000[2])	$2,171,000	NA[6]	791,214[5]
Eligible Units[11]	115,339	2,890,000 (28,650 Complexes)	NA	417,000	NA	47,461[10]
Net MWh goal	2,160	9,228	7,008 (.8aMW)	8,000 (Gross)	5,689	2,210 (2002)[13]
Net kW goal	2,410	7,190	NA	1,867 (Gross)	1,018	NA
MWh achieved	3,121	9,050 (Gross)[9] 7,621 (Net)	2,578[3] (7,000)[2]	12,963 (Net)	3,487 (Gross) 2,706 (Net)	2,769[12]
KW achieved	2,080	1,853	NA	2,391 (Net)	Winter: 400 Summer: 600	NA
Participating Buildings	31	901	31 Completed 101 Committed	1,900	NA	74
Participating Units	5,020	NA[7]	2911[4]	30,400[8]	3,514	1,114

1. Time period represents the first six months of the program's start-up year under a new program implementation structure.
2. Incentives and achievements paid and committed in the 2003 six-month program year.
3. Actual incentive payments and kWh savings achieved from 31 projects comprising 706 units from July 1-Dec 31, 2003.
4. 2,911 units committed and completed. 706 units were completed by December 31, 2003.
5. Measure installation costs, including contractor reimbursements.
6. National Grid did not provide rebates, but paid vendors instead for installation with a customer co-pay. For the multi-family component, the co-pays were typically paid by the building owners, not the residents. Disaggregated numbers for the multi-family and single-family were not available.
7. Measures installed per unit are in hard copy on rebate application forms, but are not tracked in program databases. Instead the program tracks numbers of participating buildings.
8. Estimate based upon 1,900 buildings, averaging 16 units per building.
9. Includes paid and committed applications.
10. This is the estimated eligible population for the Multi-Family Conservation Programs in 1991, which includes about 2,373 standard-income buildings built prior to 1980 code changes that required double pane windows (47,461 units). Additionally, Seattle's program focuses on electrically heated buildings (although all multi-family buildings are candidates for common area lighting upgrades).
11. Eligible units as listed here may reflect the segment of the market specifically targeted by the program rather than the entire population of multi-family units.
12. Number includes 1844 MWh from standard-income multi-family and 925 MWh from common area lighting projects.
13. 2002 goal of 2,210 MWh is based on deemed savings of 1768 kWh/unit with a goal of 1250 units weatherized

2. CONTEXT

2.1 POLICY ENVIRONMENT

Like many energy efficiency efforts, initial programs for the multi-family sector emerged after the energy shortages of the 1970s. The price spikes resulting from these shortages increased the overall awareness of the high cost of inefficient dwellings and businesses. Ultimately, federal programs designed to address residential energy use, particularly for low-income citizens, resulted. The first federal mandates to encourage efficiency investment in residential buildings included the Weatherization Assistance Program (WAP) in 1976 and the Residential Conservation Service (RCS) in 1980. These programs focused on improving the efficiency of the residential sector as a whole through providing funds for low-income families lacking resources to invest in energy efficiency (WAP), and by providing audit and energy saving information to residential customers (RCS). WAP provided grants to states (often through local community action agencies) for efficiency activities in low-income households in order to reduce the energy cost burden on them (DeCicco 1996). Utility programs soon followed, particularly in the Northwest, Wisconsin, Minnesota, New York and Chicago. Programs in Seattle, Austin and Portland followed the initial programs of the early 1980s, and the present-day versions of these early programs are included in this chapter.

Many of the early efforts to improve residential energy consumption focused on single-family homes due in part to the relatively high barriers to efficiency and conservation in multi-family buildings and the abundance of energy savings available in the larger single-family market. Penetration of weatherization measures in multi-family buildings under the early federal programs was disproportionately weak due in part to requirements that 66 percent of a building's tenants had to be income-eligible and that landlord and tenants agree upon the length of time before rent could be raised (DeCicco 1996).

While the multi-family sector is acknowledged as having great potential for energy savings (representing nine percent of residential energy end-use), retrofit activity in this sector has historically been lower than that of the larger single-family and commercial building markets due to a number of complex and interrelated barriers ranging from lack of access to capital, to the condition and complexity of the buildings, the lack of experience of installers and the perennial issue of split incentives (DeCicco 1996).

This mix of powerful barriers continues to make implementing effective programs in multi-family buildings very challenging. Consequently, these programs are less common and less evaluated than their single-family counterparts. Programs addressing multi-family buildings face some of the more complicated challenges that exist in efforts to improve commercial buildings as well as the challenges of working in single-family homes. The buildings themselves *are* commercial buildings, owned and managed for profit, and can be as complicated as any commercial building in terms of heating, cooling and ventilation. However, these buildings are also residential buildings, inhabited by individuals and families who make multiple individual choices about how to live in their apartments, usually on very tight personal budgets (DeCicco 1996). Split incentives, the most commonly mentioned barrier to efficiency upgrades in rental housing, refers to the split in economic interest between landlords and tenants. Tenants are

unlikely to invest in property they do not own, while landlords are unlikely to finance efficiency improvements if they are not responsible for paying for the energy. Overcoming split incentives through information and rebates is a common goal for multi-family programs.

Additionally, early efforts in multi-family retrofit did not always take into account the complex venting of these buildings, sometimes failing to factor in the possible air circulation through leaky hallways, windows and venting systems. Simply focusing on shell measures, as was typical in single-family efforts, resulted in some cases of buildings being tightened to unhealthy levels, leading to problems with indoor air quality. These issues continue to be debated, as illustrated in a 2004 memo to the Energy Trust Board of Directors explaining measure choice for the multi-family program. The memo notes that:

> "The Energy Trust has chosen not to implement caulking and weather-stripping measures. This decision is derived from advice that Northwest dwellings should not be tightened without first determining the infiltration rate and whether units have too much, or too little, ventilation. This determination is typically done by performing a blower door test. Blower door tests on multi-family facilities are not reliable." (Gordon 2004)

Due to this on-going uncertainty, multi-family programs need to focus on offering clear, accurate information to property owners and on improving the overall modeling and technical skills of the program staff and contractors working in this market. The sector contains a wide range of building types, which vary in construction, age, complexity and size. The variability in building configuration creates uncertainty regarding achievable energy savings, and this uncertainty only exacerbates the general reluctance of building owners to invest in energy efficiency improvements. Improving the technical understanding and accuracy of energy savings estimates continues to be a primary concern for multi-family administrators. With experience working in the sector, utilities and other implementers will increasingly be able to target the highest leverage measures – without sacrificing health and safety, comfort or equity.

2.2 PROGRAM GOALS AND OBJECTIVES

Multi-family programs can emerge out of concerns that residents of multi-family buildings are not receiving an equitable portion of the public investment in efficiency, particularly in light of the high energy cost burden as a ratio of income for many residents of multi-family buildings. However, regardless of equity concerns, the buildings themselves are large energy users and represent an attractive resource of potentially cost-effective conservation investments. Other potential program goals include stabilizing the affordable housing stock (funding improvements that may keep it occupied or prevent abandonment), reducing arrearages and increasing housing affordability through subsidizing property improvements. Some programs prohibit the landlord from charging more for improved properties for a certain amount of time. Some programs that offer rebates and financing also have restrictions that seek to interrupt the potential pass through of the costs of property improvements from landlords to tenants.

Regardless of other concerns, the primary objective of all of the R5 Programs was resource acquisition, or energy savings. To accomplish the energy savings goals, R5 Programs often had objectives related to overcoming particular barriers to investment in energy efficiency, including split incentives, lack of information, technical barriers and barriers related to lack of capital or financing. Rebates are the most common lever to overcoming these barriers. Many of

the consequences of market barriers overlap, as do the levers to overcome them. Therefore, several barriers may be addressed with the same activity. The major barriers to successful multi-family programs and the activities that may help to overcome them are described in Exhibit R5-2.

Exhibit R5-2
Multi-Family Barriers and Related Activities

Identified Barrier	Activity
Split Incentives	Overcoming this primary barrier to energy efficiency investment in rental properties requires aligning the economic interests of landlords and tenants. Direct installation programs (with no charge to residents) offer one way to overcome split incentives for tenants. These efforts often involve convincing property owners of the overall value of efficiency investment.
Lack of Information	Programs often seek to overcome this barrier by appealing to property owners in the market for equipment replacement with clear, accurate information about retrofit opportunities and financing options. It is helpful if this information is presented by a credible source. Credibility can be established based on expertise and/or through the perception that the advocate does not have a personal financial stake in the transaction (as is the case in programs implemented by governmental or non-profit organizations).
Technical Barriers	These barriers relate to the poorly understood variations in multi-family buildings. Past programs may have over-promised savings or created unintended consequences in buildings, buildings may be in poor condition, and installers may lack experience with a given building type. These barriers are best overcome by study and evaluation, including engineering studies *ex-post* to assure that savings and cost estimates are accurate. Experience with measures and confidence in the savings estimates should grow over time, provided that programs continue to support efforts to assure accuracy in savings estimates and disseminate information about building types.
Lack of Capital or Financing	This barrier reflects the fact that property owners have competing interests for capital and may have poor access to credit due to financial constraints. Barriers related to lack of capital or financing are best addressed through financing and rebate programs that offer an alternative to conventional financing.

There are no simple tools that can alone overcome all of the barriers to energy efficiency upgrades in multi-family buildings. The information in Exhibit R5–2 (above) describes potential strategies with a broad brush that may oversimplify the complexities of a given building or a given market. Two of the most powerful barriers may be simple inertia among property owners who are unlikely to take action before it is absolutely necessary and the impact of resident turnover. A stream of new tenants can create wear and tear on a building, creating maintenance issues as well as on-going educational requirements for using energy-efficient equipment.

3. COMPARISON OF PROGRAM FEATURES

This section compares the R5 Programs across the four major program components used to organize data collection and analysis. These program components are Program Design (including program theory), Program Management (including project management, reporting and tracking, and quality control and verification), Program Implementation (including participation process and marketing and outreach) and Program Evaluation.

3.1 PROGRAM THEORY AND DESIGN

Given that the ultimate goal of these energy efficiency programs is to achieve energy savings, determining which measures provide the best opportunity for achieving these savings and deciding how to promote them is the central task in program design. Generally, energy efficiency efforts in multi-family buildings tend to cluster around a few main categories of measures or activities: mechanical system upgrades, building shell measures, other building systems, and building operations and maintenance.

Mechanical system upgrades can involve a range of measures including improvements to boiler systems that range from simple tune-ups to more complicated conversions and boiler additions. Other mechanical strategies include improved thermostatic controls, improving control of central heating systems (sometimes designed without thermostatic feedback) and, most recently, energy management systems (EMS). EMS are used more frequently in commercial buildings, but they also offer a high-tech solution for any building with operations staff struggling to control and integrate building systems in an energy-efficient manner, including multi-family residential buildings. EMS represent one way to achieve better control of both commercial and apartment buildings but these systems may also require specialized training to ensure systems are properly set up and receive on-going maintenance.

When the mechanics of building-specific venting and heating system interactions are understood, **building shell or envelope improvements** can offer cost-effective energy savings and are often easy to install (DeCicco 1996). However, building shell measures can be problematic in multi-family buildings given the variation in building ventilation and requirements for indoor air quality. Shell strategies include door and window leakage reduction, insulation and inter-unit infiltration control. These strategies are "multi-family versions" of measures used successfully in single-family homes. While these measures may have resulted in dramatic improvements in energy use and comfort for single-family homes, they may not be as effective for multi-family buildings. The complexity and variation in the multi-family sector can mean that applying these same strategies in multi-family buildings, while logical, can lead to unintended or marginal results. Poor indoor air quality is a central concern, as is negative interaction with central heating systems that result in little or no realized energy savings. Window replacement is a popular shell measure due to the poor performance of many standard multi-family building windows and the important role windows can play in overall property improvement, renovation and improved appeal of the property to prospective tenants. Windows are often viewed as a multi-family program driver, which attract potential participants to the program who may then receive more comprehensive audits or building

analyses. Like some single-family efforts, multi-family programs may require that all potential measures be considered prior to offering a window rebate.

Improvements to **other building systems** include domestic hot water, lighting (including in common areas) and appliances. These measures may be easier to address in a prescriptive manner since these systems are less likely to be interrelated. For example, Seattle Multi-Family and CA SW Multi-Family both included measures representing significant investments in lighting, particularly in common areas. Other programs, like EnergyWise Multi-Family, include rebates for replacement of inefficient appliances with ENERGY STAR®-qualified units. Appliance replacement, while seemingly straightforward, can be hampered by split incentive barriers and space restrictions that limit the number of models that can be practically chosen.

Finally, building **operations and maintenance** (including related behavioral changes), can be critical to realizing estimated energy savings going forward. These activities tend to center around improving the feedback mechanisms between energy use and energy users. EMS technology can improve the feedback for buildings with operations and maintenance staff to manage the system. Converting master-metered buildings to unit-metering can improve feedback to individual tenants about their actual energy use. Thermometer setbacks and programmable thermostats are other common strategies, but require that information or training be provided to tenants. These types of measures can be undermined by behavior and require on-going commitment to realize all potential energy savings.

Program design, planning and theory should be informed by the lessons learned in over 20 years of multi-family program efforts, without being dictated by them. To understand the process by which R5 Programs were designed and implemented, program representatives were asked about program theory and planning activities. Many of the R5 Programs represent the evolution of long-running programs and tend to rely on theories related to resource acquisition and equity. Like programs targeting single-family homes, the long history of efforts in multi-family dwellings has likely created general consensus about the theory on which these programs rest – identifying and acquiring the most cost-effective energy resources available through improving the efficiency of multi-family buildings. This consensus means that developing a program theory would be unlikely, unless the program strategy or implementation mechanism were dramatically different than predecessor programs.

Several of the R5 Programs pre-date the staff contacted and interviewed, meaning they were unable to describe the initial program theory on which program activities were based. This was the case for both of the municipal utility programs - Austin Multi-Family and Seattle Multi-Family. Representatives of these two programs were unable to describe formal program theory documents, but noted that predecessor programs had existed for many years and the respective R5 Programs represented the evolution of those early efforts. Staff at the regulated utilities – National Grid and the California IOUs - described articulating a basic theory through the regulatory process. Like many regulators, PUC staffs in Massachusetts and California require descriptions of each energy efficiency program offering including target markets, expected savings, anticipated budgets and program activities. Although no formal program theory document exists for these utility programs, the planning process requires that staff be able to articulate the overarching program logic. It appears that for many programs, planning activities are a practical substitute for developing a separate program logic document.

Extensive market research focusing on the existing characteristics of multi-family buildings throughout California was conducted in 2000. The research focused on the common areas of multi-family complexes, assessing the levels of energy efficiency already being achieved in such areas, the decision-making processes of the owners/managers of multi-family housing properties, and the potential for programs to further improve energy efficiency in common areas of multi-family housing (ADM 2000). While this research was not technically program theory or logic, it did inform the strategy of CA SW Multi-Family and the measure mix ultimately selected.

Of the R5 Programs, only Focus on Energy Apr & Condo was reported to have a formal program theory document. The program theory was developed by WECC staff, its subcontractors and, to a limited extent, the state energy department. In Oregon, a formal program theory document was unavailable for the program; however, the underlying assumptions and program logic of Home Energy Savings Multi-Family were explored and stated in an initial process evaluation.

Focus on Energy in Wisconsin and The Energy Trust of Oregon are new types of non-utility organizations responsible for managing energy efficiency investments on behalf of the residents of a given area using systems benefits charges implemented through utility restructuring. While the organizations themselves may be relatively new, both exist in areas where successful multi-family programs have operated for years. These public purpose organizations represent a fundamental shift in the way energy efficiency programs are implemented. Instead of utilities offering add-on services for various classes of ratepayers, these organizations focus on energy efficiency as a goal in itself. For both Focus on Energy and the Energy Trust of Oregon, programs tend to be developed in a public process with the involvement of stakeholders. In both cases the existing utility program infrastructure and expertise was tapped for the new programs. Focus on Energy staff described developing a program theory as part of the program design. Staff members also reported shifting the overarching goal of the program from market transformation to resource acquisition based upon program experience.

The program theory and overarching program logic of Home Energy Savings Multi-Family were developed as part of the process evaluation covering the program's first year (Energy Market Innovations, Inc. 2004). The specific assumptions and hypotheses regarding investments in energy efficiency in multi-family buildings included that multi-family property owners and managers:

- Are generally not aware of assistance available to address energy efficiency opportunities;
- Require financial incentives to offset the cost of energy efficiency investments;
- Are not likely to invest in energy efficiency improvements without assistance funded through the Energy Trust; and
- Are more likely to invest in energy efficiency improvements if offered financial incentives via programs.

This acknowledgement of the high barriers related to information and investment, relying on the power of incentives and increasing the likelihood of action through targeted incentive offers is representative of the logic behind many of the general efforts in multi-family programs.

Additionally, the evaluation stated the following assumptions about market structure and program implementation related to achieving resource acquisition savings in multi-family buildings:

- Private sector contractors are not likely to invest resources in marketing energy efficiency to multi-family property owners and managers; and

- If the Energy Trust hires a centralized administrator to market and deliver services to multi-family owners and managers, there will be greater success in achieving resource acquisition savings from this sector.

The assumptions mainly focus on financial and informational barriers. The program theory anticipates that rebates and financing combined with direct marketing and information will help overcome these barriers and move the program towards its energy savings goals.

Articulating such assumptions help program staff define the underlying hypotheses of a program, which, when combined with the logic diagrams, can assure that program activities are in line with program goals and that those activities are likely to lead to the expected outcomes. Relying on simple, familiar resource acquisition strategies may mean less overall attention to program theory than might be the case in more experimental programs. Nevertheless, a simple description of program logic helps assure that all involved understand the goals and strategies of the program.

Equity concerns often drive energy efficiency investments in the multi-family sector. Program implementers are forced to address the high number of inter-related barriers because of overarching concerns that residents of multi-family buildings are not receiving an equitable portion of the public investment in efficiency, and are less equipped financially to deal with the results of that inequity. For this reason, the federal government and utilities have partnered with community development corporations, social service agencies and other non-traditional program partners to reach this sector.

CA SW Multi-Family had hard-to-reach (HTR) targets based on groups with historically low participation in previous programs. HTR customers are defined by the CPUC as "those who do not have easy access [to programs] due to language, income, housing type, geographic, or home ownership (split incentives) barriers." For all these reasons, but particularly those related to income level and the fact that a vast majority of residents of multi-family buildings do not own their living space, the multi-family sector as a whole is considered HTR.

In general, multi-family programs define eligible buildings as those with at least four units. While there are many programs exclusively targeting low-income residents, those programs were excluded from the R5 Study. Exhibit R5-3 outlines R5 Program eligibility definitions.

Exhibit R5-3
Multi-Family Program Eligibility Definitions

Program	Eligible Buildings
Austin Multi-Family	Air-conditioned buildings of four or more units
2002 CA SW Multi-Family	Multi-family complexes of five or more units and the common areas of mobile home parks[1]
Home Energy Savings Multi-Family	Multi-family buildings of five or more units
Focus On Energy Apt & Condo	Multi-family buildings of four or more units
EnergyWise Multi-Family	Multi-family buildings of five or more units
Seattle Multi-Family	Buildings of five or more units with permanently installed electric heat

1. According to Southern California Edison's Multi-family Energy Efficiency Rebates Implementation Plan, rebates were available to multi-family owners/landlords, homeowners associations, and mobile home customers of master-metered and individually metered accounts. (Southern California Edison 2002)

Best Practices

Program Theory and Design
• Have a sound program plan and clearly articulated program theory which describe the program logic, niche, resources and ultimate goal. • Understand the financial and ownership structure of the local multi-family market and the relationships among the various market actors. • Include societal and non-energy benefits in cost-effectiveness calculations. • Tailor multi-family programs to the unique needs of the sector.

- **Have a sound program plan and clearly articulated program theory which describe the program logic, niche, resources and ultimate goal**. A clear statement of program theory and/or program logic makes explicit the underlying assumptions of a program, including what it is expected to accomplish and potential indicators of success. When the underlying assumptions are well understood, those involved in program implementation and delivery are more likely to have a clear understanding of why certain measures are advocated or included. This can lead to quicker identification of program improvements and a better ability to recognize issues related to program success – one component of adaptive management.

- **Understand the financial and ownership structure of the local multi-family market and the relationships among the various market actors**. For multi-family programs, understanding the overarching financial structure within which the sector operates is critical. Working with those likely to be present at the point at which decisions about

system upgrade or replacement are made will increase the likelihood of capturing potentially lost opportunities. In multi-family programs these actors may be similar to those targeted in commercial programs, including maintenance contractors, property managers and equipment vendors.

- **Include societal and non-energy benefits in cost-effectiveness calculations.** Non-energy benefits can help improve program cost-effectiveness. These benefits and the related program goals should be clearly stated in program plans**.** To gain support for these programs, include societal and non-energy benefits in cost-effectiveness calculations. Including these benefits can offset the higher costs of working in this sector. If equity is an underlying goal, state this clearly.

- **Tailor multi-family programs to the unique needs of the sector.** Rather than offering an add-on to a single-family program component, design program activities to address the specific barriers related to multi-family buildings. Developing on-going relationships with multi-family property owners is important in overcoming these barriers and influencing investment at the point of system replacement.

3.2 PROGRAM MANAGEMENT: PROJECT MANAGEMENT

The R5 Programs offered a variety of implementing structures, ranging from traditional utility-managed programs to subcontracted programs implemented by government organizations. Credibility is a central issue for these programs, so regardless of the actual implementation structure chosen, those responsible for implementing and delivering the program must be able to provide the information and quality assurance necessary to encourage property owners to take action and leave them with measures that actually save energy, improve comfort and, ideally, improve their property.

For the Best Practices Study, the Program Management component includes the sub-components of project management, reporting and tracking, and quality and verification, which are discussed in this section. Program implementation, including its sub-components of marketing and outreach, participation process, and installation and delivery, is discussed more thoroughly in the Program Implementation section below. Exhibit R5-4 shows the different approaches for combined program management and implementation components for the R5 Programs.

Exhibit R5- 4
R5 Program Management/Implementation Approaches

Program	Program Management/Implementation Approach
Austin Multi-Family	Implemented and managed in-house by municipal utility
2002 CA SW Multi-Family	Implemented and managed in-house by IOUs
Home Energy Savings Multi-Family	Implemented and managed by a private subcontractor, Ecos Consulting (the City of Portland implemented the program within city limits), using public purpose funding
Focus On Energy Apt & Condo	Implemented and managed by a non-profit contractor, WECC, using public purpose funding
EnergyWise Multi-Family	Implemented through private subcontractors; managed by National Grid
Seattle Multi-Family	Implemented and managed in-house by municipal utility

Home Energy Savings Multi-Family and Focus On Energy Apt & Condo, the two non-utility administered R5 Programs, used similar approaches to implementation. Both programs were subcontracted *in toto* to third party contractors (Ecos Consulting in the case of Home Energy Savings Multi-Family and WECC in the case of Focus on Energy Apt & Condo).

As noted earlier, past experience has created some credibility issues related to actual versus projected energy savings for multi-family property owners. Focus on Energy Apt & Condo addressed credibility issues with property owners by providing "program consultants" to support the owner and "market provider" (contractor). The program consultants offered clear, independent information about the program opportunity and reviewed estimates of energy and cost savings. Focus on Energy Apt & Condo sought to increase the credibility of energy savings projections through review by an agent with no perceived economic stake in the project. WECC was not eligible to earn performance payments, but their subcontractors were offered performance incentives based on a price per kWh saved, along with compensation to cover labor and administrative costs - something particularly valuable given the program projects' long timelines.

Home Energy Savings Multi-Family was launched in 2003, but relied in part on existing structure and expertise in the City of Portland's Office of Sustainable Development (OSD, formerly the Energy Office) to quickly get the program up and running. The City of Portland has implemented multi-family efficiency programs in the greater Portland area since 1987. The Energy Trust selected a turnkey contractor, Ecos Consulting, to implement its residential program, Home Energy Savings. Ecos, in turn, subcontracted the implementation of the multi-family component of the program in the Portland area to the City of Portland, but directly implemented the same program for residents outside of Portland (in the service territory of Oregon's two largest IOUs, Portland General Electric and PacifiCorp). Program staff reported that the existing relationships and credibility offered by the city office proved invaluable, to the

point that the OSD will be delivering multi-family program services statewide for Ecos going forward with Ecos focusing on related marketing, administration and inspection activities.

Austin Energy and Seattle City Light (SCL) are both municipal utilities and both relied on city staff for administration, marketing, energy audits, inspections, verification and data tracking for their multi-family programs (Austin Multi-Family and Seattle Multi-Family, respectively). Neither entity employed subcontractors for program management of these programs, but both used independent contractors for actual installation. Seattle relied to some extent on installation contractors to promote the program, using field reps to contact installation contractors directly. Austin Multi-Family participants selected their contractor directly, and the program used two in-house field reps to conduct energy audits and inspections.

In Massachusetts and California, the IOUs manage efficiency programs using funds collected for public benefits. EnergyWise Multi-Family was implemented by turnkey contractors in Massachusetts who were responsible for a specific geographic region. Vendors employed their own administrative staff as well as field staff for audits. Subcontractors were brought in as needed for (certified) electrical work, air sealing, and insulation work. CA SW Multi-Family was operated in-house by each of the four California IOUs using a uniform set of program guidelines and incentive levels. Individual utilities targeted property managers and owners through direct mail, cold calls and through partnerships with local building owner/manager trade associations. The California program evaluation (Wirtshafter Associates 2003) notes that while these efforts had some success, contractor participation was largely limited to a few large firms. Each of the California utilities processed, paid and tracked applications in their service territory using standardized forms.

Best Practices

Program Management: Project Management
• Develop and retain institutional knowledge of the multi-family building sector and lessons learned as implementation structures shift over time. • Set reasonable, accurate expectations for energy savings and measure performance. • Tailor project roles to the unique strengths of each implementation organization.

- **Develop and retain institutional knowledge of the multi-family building sector and lessons learned as implementation structures shift over time.** Even in areas where the implementation structure changed significantly, successful programs tapped into the existing expertise and market relationships of previous programs. Retaining and leveraging the institutional knowledge in the program delivery network can mean using the same implementation subcontractor, reaching out to the existing network of trade allies or making program changes gradually.

- **Set reasonable, accurate expectations for energy savings and measure performance.** Continued program success in the multi-family sector depends ultimately on satisfaction

with measures installed and trust in those delivering the program. Accurate information aligns expectations and outcomes, increasing the likelihood of ultimately satisfied participants.

- **Tailor project roles to the unique strengths of each implementation organization.** The most effective marketing organization may not be the best direct service provider and vice versa. Flexibility in implementation will increase the likelihood that the players involved in program delivery offer the best level of service by allowing the appropriate mixture of utility, non-profit, governmental and for-profit players.

3.3 PROGRAM MANAGEMENT: REPORTING AND TRACKING

Having database systems capable of tracking components of program activity and performance is an important part of program management in all program areas, and was the case for the R5 Programs. It is necessary to have access to accurate information about all aspects of program activity, including numbers of participating units and buildings, measures installed and associated kWh savings. Tracking participation in this sector may involve counting living units, buildings, equipment units or floor space. These data are then used to assess program progress and accomplishments as well as to identify problem areas.

Unique tracking challenges accompany work in the multi-family sector, including the high turn-over of residents, the variety of building ownership arrangements and the number of units per building. Knowing which units in which buildings have participated is important in tracking long-term measure retention and for future program efforts. It is also important to know which units have received which measures. Some programs focus on whole-building approaches, analyzing and retrofitting all units and entire buildings, while others treat only selected units in a given building. Buildings in which all units have not been treated represent potential for future program activity. Similarly, buildings treated through previous program efforts can be re-visited at the end of measure life or when a better solution becomes available.

Programs that operate for many years with adequate tracking systems are able to target messages and contractor outreach to properties that are known and understood, often with owners that have a history of participating in efficiency programs. A recent longitudinal impact evaluation of Seattle City Light's multi-family programs, in place for over 15 years, notes that new audits of previously participating buildings may not be necessary when approaching these building owners about windows at the end of their useable lifetimes since existing program files should contain relevant measurements for windows and prior cost comparisons (Seattle City Light 1999).

Timely access to accurate and relevant information is one of the main reasons for program tracking, as is providing administrative accountability, budget management, and supporting verification and evaluation activities. The R5 Programs tracked different data at different levels of detail, but each maintained a system of tracking the information needed to assess program activity. Savings assumptions tend to be based on engineering estimates and data developed and refined through previous program experiences. At the most basic level, each program had a database for tracking program activities and monitoring cost per kW, kWh or therm. Exhibit R5-5 outlines the reporting and tracking systems used by the R5 Programs.

Exhibit R5-5
Reporting and Tracking Systems

Program	Tracking System
Austin Multi-Family	Access database
2002 CA SW Multi-Family	Individual databases at each utility
Home Energy Savings Multi-Family	Interim databases[1] and Excel spreadsheets maintained by program staff. Program also uses Goldmine, a contact management system
Focus On Energy Apt & Condo	Data systems of subcontractors[2]
EnergyWise Multi-Family	In-house database that required vendors to upload data
Seattle Multi-Family	Program tracking system and Excel spreadsheets maintained by program staff

1. The first full year of program operations at the Energy Trust required a temporary solution while a complete data management system was developed. This "FastTrack" system, developed by Conservation Services Group, will be fully launched this year.

2. Since this review, Focus On Energy has launched and now uses a program-wide database that all subcontractors employ for tracking all assessments, proposals, and committed and implemented projects.

Staff at the Energy Trust of Oregon, Focus on Energy and National Grid all described being in the process of upgrading their program tracking systems and databases, generally to enhance centralized tracking, accuracy and timeliness. This type of upgrade and information system development can be difficult to implement and expensive to develop, requiring commitment, resources, and a good understanding of the ultimate uses of the system.

The Energy Trust began work with a database contractor in 2003 to develop a FastTrack data management system capable of tracking program activities, costs and energy savings for all of the organization's program management contractors. Focus on Energy subcontractor WECC described tracking being done via the data systems of each subcontractor, something they planned to replace with a centralized, unified database. National Grid had an existing program tracking system that required vendors to upload data, but was in the process of replacing it due to difficulties in managing the difference between vendor and utility databases.

Staff of the remaining R5 Programs described relying on various databases implemented in-house at the implementing utility. Notably, programs in Austin, California and Seattle all used in-house program staff for program management. Utilities may be better able to tie program tracking to other utility tracking systems and/or rely on expertise of in-house information system staff. Austin Energy relied on an Access database to monitor the cost per kW.

Each of the California utilities maintained separate program databases. According to the evaluation of PY 2002, the structure of the databases varied significantly, but had enough common elements to facilitate on-site verification of measures installed through the program (Wirtshafter Associates, Inc. 2003). Program managers at each utility used the tracking system to stop application promotion and processing when funds were fully committed and to

determine which measures were under-subscribed. The evaluator noted the existence of multiple tracking forms and databases and suggested it was a practice to be avoided. However, this may represent a new issue related to statewide coordination rather than a particular issue with a given system. The data tracking systems adequate for each individual California IOU may need to be adjusted and standardized in light of issues related to statewide coordination, implementation and evaluation.

Best Practices

Program Management: Reporting and Tracking
• Base reporting and tracking system design on how information will be used and data needs unique to multi-family programs. • Assure that tracking systems are intuitive, straightforward, integrated and comprehensive. • Develop systems for long-term strategy and use. • Track the key components of multi-family buildings and program participation.

- **Base reporting and tracking system design on how information will be used and data needs unique to multi-family programs.** Information systems should reflect business processes. Improving basic program operation, the quality of service provided, accountability, organizational decision making, and evaluation are some of the many reasons for these systems. Investments in data tracking should improve one or more of these areas. For multi-family programs, the number of units treated per building should be tracked as well as the number of total buildings. In cases where billing analysis is desired, account numbers and meter numbers for both the building and the unit should be tracked.

- **Assure that tracking systems are intuitive, straightforward, integrated and comprehensive**. Cumbersome or overly-complex systems cause program staff to develop "work-around" solutions and duplicate systems to track information they will be held accountable for. While individual solutions developed by program staff may be adequate to meet their own needs, they reduce overall confidence in the primary tracking system. When multiple tracking documents and processes exist, it is difficult to determine accuracy if they conflict.

- **Develop systems for long-term strategy and use**. Several of the utility R5 Programs and their predecessors had been running for more than a decade. Stable, comprehensive systems can provide information and profile buildings for future program efforts which could include replacement offers at the end of measure life, or provide information on emerging efficiency opportunities that may prove cost-effective in the future.

- **Track the key components of multi-family buildings and program participation**. Tracking all aspects of multi-family buildings (including unit and complex level data)

helps assure that all cost-effective measures have been considered for a participating building. Similarly, the high turn-over of residents, the variety of building ownership arrangements and the number of units per complex also present valuable descriptions of the market and help assess the remaining opportunities for energy and demand savings. For example, it may be necessary to track both the number of participating buildings or complexes and the number of individual units treated to get a sense of the true penetration of the program, as well as to assure that the untreated units are reachable later. Similarly, tracking the locations where only common area lighting was installed offer a logical place to start when targeting buildings for unit-level improvements.

3.4 PROGRAM MANAGEMENT: QUALITY CONTROL AND VERIFICATION

It is common for multi-family programs to require higher levels of inspection of participating buildings than those called for in single-family programs. Due perhaps to the higher subsidies and costs of multi-family retrofit as well as the technical complexities associated with multi-family buildings, there were high levels of inspection and verification associated with all of the R5 Programs. Multi-family programs, like other residential weatherization programs, have a long history of extensive verification efforts. However, these efforts can be complicated by transaction costs related to privacy requirements, strained relationships between landlords and tenants and unanticipated problems related to air quality and comfort.

Quality control in multi-family retrofit programs can be thought of in two main ways. First, quality control can mean basic inspection and measure verification after the fact: Did the program get what it was paying for, and is it actually installed as described? Another approach to quality control involves training and extensive project management/technical assistance services offered at the front-end of program participation to contractors and building owners. R5 programs typically relied on a mixture of quality control strategies.

All work had to pass *ex-post* inspection for Austin Multi-Family. The verification process included visual inspection of every apartment unit in a participating facility and all removed equipment (ready for disposal), and review of final invoices, including material and labor costs for each item. Additionally, energy bills were reviewed to determine the effectiveness of the measures, using pre- and post-program consumption and engineering characteristics of the equipment to estimate program savings.

For CA SW Multi-Family, verification levels were set independently by each implementing utility. The PY 2002 program evaluation notes that all of the utilities needed to adjust their verification levels (Wirtshafter Associates, Inc. 2003). Program rebate application verifications confirmed measure installation – the basis for energy savings. According to the evaluation, PG&E and SCE performed in-field verifications on approximately five percent of rebate applications. The evaluator recommended increasing the inspections to cover all applications over a certain number of measures applied for, as well as for rebates for high dollar-value items. Implementing the increase was recommended as a way to reduce the chances of rebates being granted for measures not installed. SDG&E and SCG, on the other hand, performed in-field verification of 100 percent of applications, a level the evaluator felt was unwarranted. Ultimately, the evaluation recommended that all of the utilities implement the verification level recommended previously for PG&E and SCE.

A need for better quality control emerged as a major issue in the program evaluation of CA SW Multi-Family, particularly for lighting measures. On-site inspections revealed that a "large number of the lighting measures are being removed or failing after installation" (Wirtshafter Associates, Inc. 2003). The evaluation notes that evaluations in the future will need to address retention issues for lighting, including whether the measures were installed, whether installed measures were removed by tenants either because they did not like them or because the tenants took the measures with them when they moved, and whether CFLs burned out prematurely. Assuring quality and persistence in lighting measures is particularly important for CA SW Multi-Family, as lighting represents 95 percent of the program's filed kWh savings.

According to evaluation documents (Energy Market Innovations 2004) for Home Energy Savings Multi-Family, primary responsibility for program quality control was assigned to the program management contractor (PMC), Ecos Consulting, but the ability to spot check the PMC's work was maintained by Energy Trust staff or an independent quality assurance contractor. Ecos staff conducted quality assurance inspections for each multi-family project, installing CFLs at no charge during inspection. PMC inspectors were trained to perform quality control on multi-family housing. All multi-family buildings were inspected through a review of contractor invoices and statements by installers documenting free measures, and visual inspections by post-installation auditors.

Focus on Energy Apt & Condo employed a comprehensive front-end strategy, offering support to the building owner and market provider through program consultants capable of providing independent information on energy and cost savings and available program funds. Annual savings estimates are developed for each measure for all projects, based mainly on engineering calculations. For new construction, the program supported building simulation modeling to evaluate multiple options. In new and existing buildings, the program offered engineering calculations for different brands or models of equipment proposed by owners or developers. Providing specific, independent, objective savings estimates and other information to decision-makers encouraged them to select better options.

Focus on Energy Apt & Condo program consultants helped contractor allies assist building owners and managers in identifying opportunities for improved energy efficiency as well as increased property value and tenant safety and comfort. The program consultants were a critical component, working with building owners and their contractors as a neutral source of information helping to select and install equipment in such a way that potential energy and other benefits were realized. (Kushler et al. 2003). Focus on Energy also conducted on-site verification, targeting properties that involved multiple contractors and problematic contractors (as indicated by customer complaints).

National Grid relied on several strategies to assure the quality of the measures installed via EnergyWise Multi-Family. Efforts included field staff who provided multi-family audits, contractors who provided on-site measurement, and inspections by the implementation contractor. While third-party vendors have occasionally been used for inspection, their work was reportedly less satisfactory than that of National Grid's own program implementation contractors. Staffed report struggling to find inspectors with skill levels as high as those of the contractors themselves, noting that finding quality inspectors was important to ensuring that inspected standards were not lower than those of the program administrator. For this reason, routine inspections were done by the two implementation contractors but not at a constant

percentage level or set requirement. As a contractor gained experience with the utility's expectations and the inspections showed work meeting expectations, the number of inspected properties declined.

SCL relied on extensive involvement of in-house staff to assure that appropriate measures were selected and installed properly for its multi-family program. Staff performed the initial audit and recommended measures, reviewed bids with the building owner, served as general contractor for the project, and performed a final inspection of the completed job. This degree of involvement of in-house staff in all phases of the project was unique among the R5 Programs, but is representative of the higher level of program staff support and involvement in multi-family programs more generally.

Best Practices

Program Management: Quality Control and Verification
• Base quality control practices on a program's vendor relationships, measure types and project volume. • Conduct quality assurance and verification inspections to improve the overall understanding of how multi-family buildings function. • Govern post-inspection levels by cost-effectiveness as well as quality assurance considerations. • Conduct inspections in a timely manner. • Use product specifications in program requirements and guidelines.

- **Base quality control practices on a program's vendor relationships, types of measures, and project volume.** Standard measures installed by known vendors are likely to need less rigorous quality control and verification than higher risk measures (e.g., those with potential impact on indoor air quality, or those that represent more cutting-edge technology, like EMS systems).

- **Conduct thorough quality assurance and targeted on-site verification inspections to improve the overall understanding of how multi-family buildings function.** Assuring that measures are installed and operating as expected is particularly important in multi-family buildings given the complexity of the sector and on-going need for information about what works and doesn't work in different climates, in various building types and with different measures mixes.

- **Govern post-inspection levels by cost-effectiveness as well as quality assurance considerations.** Multi-family projects can be large and have long timelines. Inspecting 100 percent of jobs is unlikely to be cost-effective, particularly for high volume programs with small impacts per site. A good rule of thumb is 10-30 percent for small projects and 100 percent for large projects and problem vendors. When planning for inspection:

- Obtain a good random sample representative of all vendors and measure types.
- Consider inspecting the first few jobs submitted by a new vendor.
- Periodically assess results of inspections to determine if adjustments are needed. For example, if 100 percent inspections uncover no or very few problems, inspections could be reduced.
- Only tolerate a 100 percent post-inspection for "problem" vendors on a temporary, probationary basis. If evidence of poor performance continues, the individual contractor should be permanently excluded.
- Utilize a contractor screening/certification/training process to encourage the participation of responsible contractors and help ensure high-quality installations.

- **Conduct inspections in a timely manner.** Real-time feedback from inspections can uncover problems that can then be corrected in the same program year. Evaluation can detect the same problems, but is generally performed too late to enable course correction mid-program.

- **Use product specifications in program requirements and guidelines.** Contractors should explain all product warranties to their customers and be prepared to respond to incidents of product failure. Requiring contractors to repair and/or replace products that fail before warranty expiration will help assure that contractors use high-quality products and stand by the performance of the products they install.

3.5 PROGRAM IMPLEMENATION: PARTICIPATION PROCESS

Participation processes can be less straightforward for multi-family buildings than for their single-family counterparts due to the complex nature of the multi-family building systems, the presence of tenants, and the variety of the building stock itself. Generally, participation in multi-family programs requires that the building owner initiate contact either directly or through a contractor to find out about eligibility and participation requirements. This contact may happen at the point of system failure or replacement or due to building owner concerns about occupant complaints or increasing energy costs (particularly in master-metered buildings).

Targeting buildings most likely to benefit from multi-family program activities is ideal, but can be difficult due to the lack of metering and billing data, the existence of common areas and the existence of multiple buildings per complex. Regardless of these difficulties, defining and targeting appropriate buildings is likely to be a major success factor for multi-family programs, as energy and load effects are tied directly to the number of participating buildings. R5 Programs used multiple strategies to identify and contact representatives from potential buildings. Exhibit R5-6 outlines the various program tactics.

Exhibit R5 -6
Summary of R5 Program Tactics

Tactic	Austin Multi-Family	2002 CA SW Multi-Family	Home Energy Savings Multi-Family	Focus On Energy Apt & Condo	EnergyWise Multi-Family	Seattle Multi-Family
Pre-Installation Audit/Review	✓		✓ (Not Required)	✓	Unclear	✓
Loans or Financing						✓
Rely on Trade Allies or Program Qualified Contractors			✓	✓	✓	✓
Prescriptive Rebates	✓	✓	✓	✓	Co-pay	Contractor Payments
Custom Rebates				✓		
Direct Install			✓ (CFLs)	✓ (Common Areas)	✓ (Unit Level)	
Post-Installation Inspection	100%	% Varies	100%	Unavailable	Unavailable	100%

There are two main participants in multi-family programs: the building or property owner and the participating contractor (referred to in some of the R5 Programs as "trade allies"). Contractors were brought into R5 Programs in a variety of ways. Some programs pre-qualified or even trained their trade allies, offering direct referral in return for their agreement to follow program specifications. Others specified contractors and limited program installation to a few, pre-selected installation contractors – often those with particular expertise in multi-family buildings. Still others cast a wider net, not pre-screening or selecting installation contractors.

Potential Austin Multi-Family participants contacted Austin Energy directly and selected their own contractor. A free, walk-through energy audit was conducted by professional energy auditors, who identified potential energy improvements that qualified for rebate incentives. The audit was required before a rebate application was accepted. A rebate application and signed contract or signed bid had to be received and approved before measure installation. The City of Austin issued a Letter of Intent to approved applicants, committing rebate funds for eligible measures. Limitations were clearly stated, including minimum ($25) and maximum ($100,000) rebate levels. The maximum rebate levels included sub-system limits of no more than $56,000 for mechanical systems and $44,000 for weatherization and lighting improvements. Participants had 90 days from the date of the Letter of Intent to complete installation.

Prior to 2002, the incentives for multi-family properties were administered through a combined single and multi-family Residential Contractor Program (RCP). As part of the RCP, the

participation of multi-family properties was low. In 2002 the multi-family sector was targeted directly by the new, separate Austin Multi-Family which was targeted directly to property managers and owners. Participation in the 2002 program was likely affected by this change in program strategy, something that often creates confusion in the marketplace and a ramp-up period for new programs.

CA SW Multi-Family targeted property managers and owners through a variety of marketing and direct contact tactics, including direct mail, cold calls to large property owners, and teaming with local building owner/manager trade associations. The PY 2002 program evaluation notes that while these efforts had some success, contractor participation was largely limited to a few large firms (Wirtshafter Associates, Inc. 2003). To participate in CA SW Multi-Family interested parties (including contractors, building owners or property managers) had to make a qualifying purchase, install the measure or have it installed, obtain a standardized application form, complete it and return it with supporting documentation to their utility for processing. Each utility processed, paid and tracked its own applications.

In PY 2002, applications for CA SW Multi-Family were accepted and processed on a first-come first-served basis with no limitations, creating issues concerning measures that were fully subscribed quickly. The PY 2003 multi-family program launched with a reservation system to avoid oversubscription and to track total committed incentives. According to the PY 2002 evaluation, the reservation system should also prevent contractors from locking up a disproportionate amount of program funding that may not in fact result in actual measure installations. The reservation system gave contractors 45 days to file completed rebate applications. In addition to the reservation system, the CPUC established a five percent limit on the amount payable to a single entity at any one time. In response to this cap several contractor organizations formed new sister companies to provide services under the program and maximize the use of the incentive money. Several of these companies operate from the same physical addresses and offer the same services as one another, although they may target different geographic areas. (Wirtshafter Associates, Inc. 2003).

There were four basic ways that potential participants began the program process with Home Energy Savings Multi-Family. An owner or building representative could have contacted the Energy Trust directly via a toll-free number. Contact could also have been initiated by a program representative to discuss the program opportunity with the property owner or representative. Contractors connected to a building who were not qualified trade allies may also have contacted the program, in which case they were given information about the program and how to become a qualified trade ally. Finally, multi-family residents may have contacted program representatives themselves, in which case they were advised to contact the owner or manager of their building about the potential program opportunity.

Once contact was made a program representative or participating trade ally determined eligibility for program services and provided initial information on measures, incentives and rebates. If the owner or owner's representatives identified potential eligible measures, he or she could have either arranged for a Multi-Family Energy Review (Review), sought retrofit services from a trade ally without a Review, or self-installed measures (Energy Market Innovations, Inc. 2004). If a property owner sought a Review, it was provided either by program staff directly or by a trade ally. The reviewer used the inspection to estimate the project's energy savings potential, cost and incentive estimates, projected payback calculations and, if necessary, to

provide referral to a trade ally contractor. Once trade ally contractors were contacted, the owner or property representative reviewed bids and selected a contractor or submitted a bid for self-installation. Bids were reviewed by program representatives who calculated the potential incentive. Once the retrofit work was complete, the property representative completed the required paperwork and retuned it with invoices for the work to the program office for a rebate. Windows-only projects were reviewed and any feasible shell measures were required to be completed before windows were rebated.

Focus on Energy Apt & Condo relied on market providers (including distributors and contractors) likely to be contacted when system replacement was being considered. These market providers identified multi-family buildings and tapped into program resources for technical support and incentives likely to increase the efficiency of the replacement equipment ultimately chosen. This approach meant that the program could target its resources toward property owners that had already decided to invest in system or equipment upgrades and needed advice and clear information about choices. According to program staff, these contractor referrals were a key strength representing a much more effective outreach strategy than cold-call assessments or audits. The program had a progressive incentive schedule to induce participants to install measures by considering whole-building and/or highest efficiency approaches. Rewards were adjusted in PY 2003 to minimize lost opportunities by encouraging owners to implement all recommendations.

In addition to using contractor allies for outreach, Focus on Energy Apt & Condo also relied on a team of trained consultants to work with owners and their contractors to select and install equipment, helping ensure that potential savings and other benefits were realized. The program consultants provided additional information and other assistance to help participants select and implement cost-effective measures. More important for long-term program effectiveness was the dynamic between the program consultants and installation contractors. Over time, contractors learned that program consultants could help convince owners to purchase higher efficiency equipment, which made them more likely to refer owners to program consultants.

National Grid relied primarily on word of mouth information and some outreach targeted to high-use properties to find program participants for EnergyWise Multi-Family. As for the single-family component of EnergyWise, the Multi-Family participants paid the program contractor the required co-pay for qualifying measures. The vendor (program contractor) billed National Grid for the difference. For EnergyWise Multi-Family, whoever signed the contract (the building owner, property management company or association) was responsible for the co-payment. The utility did not charge co-payments for work done within individual units, only in common areas. The program vendor (or implementation contractor) was responsible for marketing, education, monitoring and installing measures.

As noted in the quality control and verification section, SCL staff had significant interaction with Seattle Multi-Family participants throughout the process. The building owner had to apply to the program and be entered on a waiting list. Following application, SCL staff performed an audit on the participating building and recommended measures. After the audit, building owners solicited bids from qualified contractors in a group bidding process. SCL staff reviewed bids with the building owner, who ultimately selected the successful bidder and signed work contracts. During installation, SCL staff served as the general contractor and monitored work as measures were installed. Finally, SCL staff performed inspections of completed jobs, established

warranties and paid contractors. For customers with loan repayment requirements, SCL staff set up repayment schedules at this point. The entire process sometimes took up to eight months. Common area lighting projects usually had somewhat shorter timelines, generally requiring just two to four months.

Each of the R5 Programs offered a different mix of measures eligible for rebates, loans or distribution free of charge. Taken together, they represent the variety of cost-effective measures available to multi-family building owners and residents as well as the different climates and avoided cost realities embedded in regional differences. The specific rebate schedules are too complex to be reproduced here, rather a high-level description of qualified measures for R5 Programs is illustrated in Exhibit R5-7.

Exhibit R5-7
R5 Program Qualified Measures

Austin Multi-Family	2002 California SW Multi-Family	Home Energy Savings Multi-Family	Focus on Energy Apt & Condo	EnergyWise Multi-Family	Seattle Multi-Family
Air Conditioner Installation/Replacement Heat Pump Installation/Replacement Window Treatments, including Solar Screen or Solar Film Ceiling Insulation Air Duct System Diagnostics and Improvement Interior Lighting (including Fixtures, CFLS and Ballasts) Common Area Lighting	Attic or Wall Insulation ENERGY STAR-Labeled Lighting and Ceiling Fans with CFL ENERGY STAR-Labeled Clothes Washers and Dishwashers High Performance Dual-Pane Windows High Efficiency Exit Signs Occupancy Sensors Central System Natural Gas Boilers & Water Heaters (and Controllers) Natural Gas Furnaces Central Air Conditioning and Central Heat Pump Showerheads and Faucet Aerators Programmable Thermostats	Attic, Wall, or Floor Insulation High Performance Windows Insulated Exterior Doors Showerheads Water Heaters for Individual Units (Electric) Direct Install CFLs High Efficiency Boilers/Boiler Vent Damper and Tune-up (Gas Heat)	Electricity to Natural Gas Conversions for Boilers and Water Heaters Natural Gas Furnaces, Boilers, and Unit Heaters Attic and Wall Insulation Natural Gas Water Heaters Setback Thermostat ENERGY STAR-Qualified Clothes Washers and Room Air Conditioners High Efficiency Air Conditioners Common Area Lighting	Unit and Common Area Lighting Torchieres Refrigeration Water Heaters Space Heaters Air Conditioner Timer Heat Pump	Insulated Windows Ceiling, Wall and Crawlspace Insulation Efficient Lighting Modifications (Delamping and Replacement Fixtures) Showerheads Common Area Lighting

Best Practices

Program Implementation: Participation Process
• Offer a single point of contact for customers. • Offer an attractive mix of eligible measures and integrated program services that include potential program drivers, but tie rebates for the most popular measures to those less likely to be considered and installed. • Use a whole-building approach to achieve maximum energy savings. • Provide support to building owners throughout the process.

- **Offer a single point of contact for customers**. Multi-family projects, particularly those involving complex system upgrades or long timelines, benefit from having a consistent single point of contact for busy property owners. In many ways, this type of single point of contact is similar to the service provided to large utility customers who may have a relationship with their utility representative.

- **Offer an attractive mix of eligible measures and integrated program services that include potential program drivers, but tie rebates for the most popular measures to those less likely to be considered and installed.** Program staff in Seattle and Portland acknowledged that rebates for windows were the primary measure of interest to owners. (Building owners are very interested in window upgrades, seeing them as something that can improve property values.) Seattle Multi-Family and Home Energy Savings Multi-Family leveraged that interest by only rebating windows if all other cost-effective measures had been considered and installed. A note of caution is warranted however: Programs that use this strategy will need to avoid over-paying for measures that come to dominate the market.

- **Use a whole-building approach to achieve maximum energy savings.** Approaching the building as a system allows auditors, project managers and contractors to consider the complex interactions of HVAC and air flow, windows and mechanical systems, and shell issues with air change per hour (ACH) requirements. However, this approach may require more time and hands-on project management. Programs managers interested in pursuing this approach will need to budget for the additional time and expertise required to integrate building systems, model the impact of upgrades and install the measures.

- **Provide support to building owners throughout the process.** Given the high barriers to multi-family retrofit, every effort should be made to assure that owners are given adequate and accurate information throughout the project. Offering a review by a neutral party such as a program consultant or representative can offer credibility to contractor proposals and assure that measures are logical and appropriate.

3.6 PROGRAM IMPLEMENATION: MARKETING & OUTREACH

Marketing and participation are closely tied to success for energy efficiency programs, and those for the multi-family sector are no exception. Identifying multi-family buildings and having a program in place at the point of equipment replacement appears to be one of the most critical components to reaching participants. Multi-family buildings are not always identifiable from billing data, particularly for unit-metered buildings, making the identification of potential participants a challenge. R5 Program staff reported a range of tactics used to reach multi-family building owners and simply identify properties, including drive-by confirmation of buildings, trade shows, property management company lists and relying upon market participants for information.

Multi-family programs are more likely to target specific properties and/or owners than their single-family counterparts. This targeting can be complicated for buildings with unit-level metering, as the billing data is not likely to indicate whether or not an account is in a multi-family building. One of the most common tactics involves targeting the property owner or manager directly through advertising in trade magazines and at trade events, enticing them to participate with rebates or loans that buy down the cost of equipment upgrades or building retrofit measures. Multi-family programs employ a wide range of strategies for technology replacement including retrofit, early replacement, normal replacement and early retirement.

Long-standing programs tend to demonstrate better marketing and outreach effectiveness. Regardless of how properties are identified, if a program is not in place to accept the property and/or funding is exhausted, the opportunity may be lost. Long-standing programs with consistent program funding can also offer consistent marketing messages that improve their credibility with market actors. These long-standing programs have also had time to develop, mature, and earn consumer confidence – potentially increasing the overall success of the program (Kushler 2003).

Marketing efforts varied among the R5 Programs, but focused on the basic issue of identifying and recruiting potential participants. Marketing and incentives worked in tandem to increase the overall awareness and motivation to take action among multi-family property owners and managers.

Austin Energy placed advertisements in trade publications for apartment building owners and managers. Austin Multi-Family and its predecessors were in place for over 15 years, and program staff reported that over time the levels of awareness of the program steadily increased. However, new entrants to the market (i.e., new property owners), turn-over of property managers and property sales created a need for on-going marketing. An in-house marketing and communications department developed collateral materials and marketing messages. Program staff reported being pleased with the overall quality of marketing products, but noted that in-house staff required a longer lead time than contractors.

Significant changes were made to CA SW Multi-Family's predecessor, California's Residential Contractor Program, in its evolution to CA SW Multi-Family. These included focusing on property owners and managers rather than on the installation contractors who had been the primary delivery mechanism in previous years. Following a slower than anticipated start-up,

the utilities implementing CA SA Multi-Family took additional steps to attract the attention of the market including distributing marketing postcards and follow-up notices, adjusting rebate levels to some measures to make them more attractive, shifting additional incentive funds to popular measures to maintain market response, and meeting with market stakeholders to discuss changes to the program for 2003.

Contractors took an active role in promoting CA SW Multi-Family, recruiting property owners and managers directly through their relationships with them as a vendor or service provider. Energy efficiency and program information was also disseminated through utility collateral materials, customer information lines, Web sites and specific efforts to reach HTR populations. One marketing challenge noted in the PY 2002 program evaluation is the limited availability of incentive funds. A steady stream of funds available would have resulted in steadier marketing efforts. This could also have reduced the rush to reserve funds (Wirtshafter Associates, Inc. 2003).

Market research conducted in 2000 noted that contractors continued to be a key source of information for a majority of multi-family decision makers, and contractors were described by program staff as highly motivated and as playing a valuable role in helping utilities meet the specific measure goals for 2002 (ADM 2000). While California multi-family program managers expected that contractors would always play an important role in marketing their programs, they wanted to improve program awareness and increase the active participation by property managers and landlords themselves. To this end, utility staff attended trade shows, sent post cards to property managers, included flyers in trade journals and ads in trade magazines, and sent letters directly to known property managers, including past program participants.

To promote Home Energy Savings Multi-Family, the Energy Trust focused on building owners and managers with its outreach, marketing and advertising. The PMC and the Energy Trust jointly conducted marketing efforts that included direct mail, direct personal contact, distribution of collateral materials, including related information on the Energy Trust Web site and attendance at trade association meetings. The program also placed advertisements in trade association publications. The Energy Trust qualified installation contractors as "trade allies." Those who participated in this capacity were encouraged to promote the program to customers and support the sales and installation of appropriate energy efficiency equipment, participate in continuing training, install appropriate equipment and verify and report installations with accuracy and timeliness. A contractor guide outlining program goals and requirements was provided to trade allies. However, the guide focused on the single-family component of the Home Energy Savings Program and did not outline the specifics related to multi-family buildings.

Focus on Energy used bill inserts and newsletters and seminar presentations targeting building managers to promote Focus on Energy Apt & Condo. The main goal of marketing efforts for the program was to recruit contractor allies, supporting their efforts to recruit their own customers using case studies and other material designed to help them sell the program. The program used contractor allies to leverage outreach efforts to those property owners who had already decided to improve their properties. Targeted incentives and information was designed to encourage these property owners to choose the highest efficiency option available, and to consider additional measures through a "whole-building" approach.

Vendors were responsible for recruiting all participants for EnergyWise Multi-Family. Vendors would typically make the initial contact with a building owner or property manager, contacting National Grid for assistance in determining eligibility. EnergyWise Multi-Family was marketed through direct mail or contact by program vendors and subcontractors. Billing data may have been accessed to help identify high-use buildings (likely to be multi-family), but program vendors were more likely to rely on personal knowledge of an area, word-of-mouth referrals and even drive-by assessments of properties for the same purpose. There was no central source of information about multi-family properties in the Massachusetts service territories reviewed for the R5 Study, making subcontractor familiarity with an area critical to program recruitment.

SCL did not advertise Seattle Multi-Family, relying, instead, on contractor allies to disseminate information about the program via word-of-mouth communication when property owners were considering investing in equipment upgrade or replacement. SCL staff reported that in print, radio and TV advertising was expensive and did not seem to generate a high number of applications. According to program staff, apartment owners and managers appeared to represent a small, interconnected group of multiple property owners. Instead of mass marketing, the program directed messages to potential participants and offered extensive quality control for participating properties.

Best Practices

Program Implementation: Marketing and Outreach
• Develop and use a database or other method of tracking the population of multi-family properties and conduct periodic market assessments to update the information. • Work with the property owners and other market participants to help them succeed according to their objectives and promote program benefits that align with these objectives. • Build relationships with the maintenance and equipment firms responsible for system operations and maintenance. • Showcase properties that have completed program upgrades.

- **Develop and use a database or other method of tracking the population of multi-family properties and conduct periodic market assessments to update the information**. Multi-family building populations can be difficult to identify, even with utility customer information systems. Developing a population frame, though difficult, provides multiple benefits both in terms of target marketing and tracking program penetration over time. In conducting this research, programs should rely as much as possible on tax records, permit applications or other existing sources to reduce the overall cost to develop the information.

- **Work with the property owners and other market participants to help them succeed according to their objectives and promote program benefits that align with these**

objectives. Aligning program activities with the goals of the market participants may mean helping them market their services, providing advanced training, helping improve property values for building owners or any number of strategies to entice participation. For example, in its marketing material, SCL lists six benefits of program participation, only one of which concerns electricity consumption. The other benefits listed with program information include increased property value, reduced tenant turn-over, increased tenant comfort, reduced maintenance, and reduced outdoor noise.

- **Build relationships with the maintenance and equipment firms responsible for system operations and maintenance.** These firms are likely to be involved in the decision-making process at the point of system upgrade or replacement and are uniquely positioned to provide information about options to building owners or others responsible for capital decisions. If they are aware of the program and trust that it will continue to be available they are more likely to search out information on energy efficiency at critical customer purchase points.

- **Showcase properties that have completed program upgrades**. Identifying and promoting the properties with completed program upgrades can help potential residents choose more efficient buildings and can improve the overall economic value of participation for property owners.

3.7 PROGRAM EVALUATION

Evaluations are a critical part of feedback on programs and an important element of success which allow programs to evolve in response to lessons learned by staff and experience gained in the market. Without the neutral feedback of an evaluation, it is difficult for program staff to identify and target specific areas for improvement. Unfortunately, evaluations of multi-family programs are rare. Most energy efficiency program evaluations are conducted for the larger single-family residential programs or commercial and industrial programs. This is due in part to the relatively small number of programs that specifically target multi-family programs and the overall difficulty of evaluating program impacts in multi-family buildings due to the high numbers of variables and interrelated systems. Even among the R5 Programs, comprehensive evaluations were rare.

Austin Energy no longer has an evaluation department and is not contracting for evaluation services for the multi-family program. City of Austin staff relies on DOE 2 modeling and deemed savings to estimate impacts for annual reporting documents. Evaluations were conducted for earlier multi-family programs.

California conducted the most comprehensive evaluation of all the R5 Program implementers (Wirtshafter Associates, Inc., 2003). Due in part to the change in multi-family program delivery (including statewide coordination) and the CPUC's commitment to evaluation, CA SW Multi-Family benefited from a thorough review including process and impact assessments, interviews and surveys with market actors, on-site verification and an HTR assessment. California's evaluation efforts are valuable not only for its programs, but also for similar programs being implemented elsewhere. While impact data may not be directly transferable due to differences in climate and/or building characteristics, the process sections reveal lessons about working

within the retrofit market, the characteristics of multi-family property owners and their decision-making processes, as well as lessons learned in actual program implementation.

The Energy Trust conducted a thorough process evaluation of its Home Energy Savings Program as the program was in its first year (Energy Market Innovations, Inc. 2004). While the evaluation itself was thorough, it was dominated by a study of the larger single-family component that struggled in its first six months. Home Energy Savings Multi-Family was presented and described in enough detail to get a feel for the program. The process evaluation included a description of the program's history and implementation structure, the program theory, estimates of program performance and other process-related issues (including marketing, recruitment, and administration). Evaluation efforts are continuing in 2004, the second year of the program.

The pilot program of the Focus on Energy Apt & Condo program was evaluated (PA Government Services 2003). The evaluation included process and impact components as well as an evaluation of non-energy benefits. However, the pilot program was structured differently than Focus on Energy Condo & Apt, using a cold-call model rather than relying on market allies to recruit participants. Focus on Energy Condo & Apt has yet to be evaluated. Instead, program staff relied on estimates of energy impacts derived from agreed upon deemed savings. An evaluation team is prioritizing process evaluation issues for future contract years, so it is possible a more comprehensive evaluation will be conducted in the future.

National Grid conducted an impact evaluation of EnergyWise Multi-Family which focused on estimating energy and demand savings (Itron 2003). Process evaluations had been conducted for early predecessor programs, but evaluation efforts now center on program impacts. The PY 2002 evaluation describes the extensive statistical methods and modeling strategies employed to determine energy and demand impacts, but contains very little information about the program itself. It is particularly difficult to tease out the nuances of the multi-family program as it was implemented in tandem with the single-family program through the same vendors. Regardless of the lack of information on program processes, the evaluation carefully assesses the energy impacts of EnergyWise Multi-Family, providing a valuable model for programs struggling to assess impacts in complex multi-family buildings. The evaluation relied on statistical analysis of billing data using estimates of energy savings and weather conditions as inputs to generalized least squares and end-use models, using the facility as the basic unit of observation.

Although recent evaluation documents do not exist for Seattle Multi-Family and its immediate predecessors, in the late 1990s SCL conducted extensive longitudinal impact and customer service evaluations for its multi-family programs and various components. SCL has historically pushed the envelope in establishing methods for evaluating its multi-family programs, developing methodological approaches to analyze the program in 1986 and 1987 when there were few models on which to base evaluation efforts. In the 1999 Longitudinal Impact Evaluation, SCL relies upon energy consumption data, weather data, engineering projections, gross and net savings equations and regression analysis to estimate energy savings. In addition to the extensive modeling and analysis, the document describes the history and process of program implementation and delivery in detail (Seattle City Light 1999).

Best Practices

Program Evaluation
• Use evaluation to assure that energy savings meet expectations and that participants are satisfied with installed measures. • Produce a basic report document describing program activities, budget and expenditures, estimated savings and lessons learned for un-evaluated program years. • Conduct evaluation at the most comprehensive level possible given time and budget constraints. • Include estimation of free-ridership and spillover. • Use baseline or market characterization studies to inform the program scope and measure mix selected.

- **Use evaluation to assure that energy savings meet expectations and that participants are satisfied with installed measures.** The critical value offered by evaluation is the opportunity for feedback on and analysis of program strengths and weaknesses. Successful programs plan for evaluation and incorporate the results in a paradigm of continuous improvement.

- **Produce a basic report document describing program activities, budget and expenditures, estimated savings and lessons learned for un-evaluated program years.** This document can offer general information on program activities and milestones to stakeholders and other interested parties. Most of the R5 Programs produced some kind of annual report, however the level of detail varied widely and the programs were often described in combined budget line items that did not reflect functional separation (e.g., combining multi-family and single-family budgets).

- **Conduct evaluation at the most comprehensive level possible given time and budget constraints.** Process evaluations are important for programs in their early years and for those in transition. Impact evaluations are important for all programs, and should be conducted frequently enough to assure savings are being delivered and other program goals are being met.

- **Include estimation of free-ridership and spillover.** Determining the level of free-ridership and spillover can be challenging, but is valuable because of the insight it offers to program cost-effectiveness and the role of the program in the market.

- **Use baseline or market characterization studies to inform the program scope and measure mix selected.** The multi-family market is a complex mix of building sizes, types and ages. Programs informed by the actual characteristics of the market can better target program resources and assure that the market needs the products and services promoted by the program.

4. COMPARISON OF OUTCOMES

Energy efficiency programs and portfolios are often designed with specific policy objectives in mind, and those objectives can often impact the outcome of a program. For example, programs that target hard-to-reach areas may not exhibit the same rates of participation as those that do not. Key factors that affect cost effectiveness and program outcomes include:

- **Energy efficiency policy objectives –** policies that emphasize different goals such as market transformation, resource acquisition, equity, etc. will drive different program designs and program objectives.

- **Market barriers addressed** – programs that seek to mitigate difficult barriers may have poorer performance-related metrics because they attack tough problems, in contrast to programs that may have excellent ostensible metrics because of cream skimming.

- **Measure mix** – the mix of measures installed in a program can significantly affect a program's cost-effectiveness.

- **Demand/energy** – the extent of peak demand versus energy focus of the program can, by definition, affect the cost-effectiveness of the indicator in question (e.g., a peak demand oriented program may score poorly on an $/kWh metric). This can be considered a part of the measure mix factor listed above.

- **Multi-year policy objectives** – if consistent, help programs to achieve goals that require medium to long-term market presence and extensive program infrastructure; if inconsistent, make achievement of such goals more difficult.

- **Multi-year funding levels** – if consistent, allow programs to set multi-year goals and maintain consistent presence and messages among end-users and supply-side market actors; if inconsistent, makes maintaining a stable market presence more difficult.

- **Program/Market Lifecycle** – where a program or key measure is in its product lifecycle will affect its cost-effectiveness. For example, a program seeking impacts from the last 50 percent of the market to adopt a product that has penetrated the first 50 percent of the market should be expected to be more costly than one attacking a market with a low or insignificant saturation level.[1]

- **Climate** – for example, HVAC measures are more cost-effective in severe climates than in mild climates because absolute savings are strongly a function of base usage levels.

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[1] There are at least two reasons for this. First, in more highly saturated markets, it is more difficult to find the remaining measure opportunities and, second, the remaining market is typically characterized by late majority and laggard organizations that are more resistant to adopting new products and practices. In addition, a program in the first-year of a multi-year plan to impact a market may have poor first-year metrics because of the associated startup costs and time it takes to create awareness and other program effects.

- **Customer/target market actor mix** – the mix of customers and trade allies often plays a role in cost-effectiveness, for example, a program in a market with larger commercial customers will tend to be more cost effective than an identical program in a market of smaller commercial customers, all other things being equal; similarly, programs with customer segments with longer full-load equivalent hours will be more cost-effective than those with lower average full-load hours of operation (also related to climate).

- **Customer density** – delivering an energy efficiency program to a relatively dense population base will be less costly than delivering to a sparser population, all other things being equal.

- **Customer Energy Rates** – higher electricity rates should lead to higher levels of measure adoption, all else being equal.

- **Economic Conditions** – willingness to invest in new products and practices changes in response to short-term economic and market conditions, which may vary across regions.

- **Customer Values** – efficiency program effectiveness can vary as a function of differences in customer values, again, all else being equal.

This section presents cost-effectiveness estimates obtained from the R5 Programs. Information is presented on the Total Resource Cost (TRC) test, the associated discount rate and the average measure life, where available. A second cost-effectiveness metric, the Utility/Program Administrator Cost test, was not widely available. The total program cost shown per kWh saved is an indicator related to the Utility/Program Administrator Cost test in that the numerator includes all program costs and excludes any customer contribution to measure costs. Also shown are non-incentive dollars spent per kWh, which offer an indication of the cost to market and administer. Incentive dollars per kWh shows the overall average incentive amount per unit of estimated first-year impact.

Exhibit R5-8 displays cost-effectiveness data for the R5 Programs. This exhibit illustrates some of the general components of cost-effectiveness, but has not been normalized to control for the differences in equations and does reflect the variety of assumptions used to determine actual energy savings resulting from program activities.

The wide range of measures covered by these programs and the range of incentive levels make direct comparison difficult. While the overall energy savings related to a given measure may be relatively straightforward, the actual cost-effectiveness varies depending on the rebate or incentive level, the estimated measure life and the regional avoided cost. Net to Gross (NTG) ratios, where available, were calculated differently in each program. California's program implementers were directed by the CPUC to use a NTG value of 0.89 for residential programs (based on an average of previous evaluation study results).

The California program represented the first program year after transitioning away from the Residential Contractor Program that had provided services to the single- and multi-family markets prior to 2002. The RCP proved to be expensive relative to the energy savings achieved and it was hoped that a more straightforward, customer-driven rebate program would maximize incentive dollars while increasing participation. In part due to this change in program

strategy, the California IOUs all struggled to meet the energy and demand savings targets established for CA SW Multi-Family. For PG&E this meant saving 2,480,437 kWh out of a target of 3,751,245 kWh (66 percent of established target). The program delivered 19 percent of PG&E's established demand reduction (853 kW out of a target of 4,420 kW) and ten percent of therm savings target (70,250 out of a target of 708,970). Collectively, the California IOUs met 57 percent of the kWh goal, 26 percent of the kW goal and 33 percent of the therm goal.

For a variety of reasons the multi-family market did not respond as predicted to the measures and rebates selected for the program, making it difficult for the utilities to meet energy savings goals even with increased marketing and outreach efforts. PG&E documents several factors contributing to lower than anticipated program achievements including high barriers related to split incentives, low rebate amounts and a forecasted measure mix that was different from the measure mix the multi-family market actually selected. Additionally, the program suffered from the effects of short program periods relative to the time required to develop, finance and install projects in multi-family buildings.

The measure mix forecast "did not reflect the reluctance of landlords to invest in energy efficiency but was a result of the program design attempt at creating a more comprehensive installation of measures that would provide great benefits to tenants" (PG&E 2003). Popular measures for the 2002 CA SW Multi-Family Program included those with low cost, high incentives and short payback, or those that were fully incented—not necessarily those that would generate the most energy savings (PG&E 2003). After shifting funds from measures that were not selling to the measures that were, PG&E's program saw total sales and installation of 12,511 interior hardwired fixtures—626 percent of the program's target.

In light of low response rates to the entire mix of measures, all of the IOUs redoubled their marketing efforts and met with stakeholders from the multi-family market in an effort to increase participation. This was particularly true for gas measures, which received very little attention from the market. Southern California Gas attempted to address these issues through:

- Direct mail to property management companies;
- Cold calls to large property owners identified from previous program participation and earlier direct mail attempts;
- Follow-up with property owners who previously inquired about the program, but who have not submitted applications;
- Placement of ads in property management publications;
- Development of a complete Web page devoted to MF program information; and
- Working with the Diverse Markets Outreach Program by presenting overviews of its programs to representatives of Asian language descent.

The market did respond to the increased marketing efforts, but "not sufficiently to attain program energy goals" (SCG 2003).

Exhibit R5-8
Multi-Family Program Effects

	Austin Multi-Family	2002 CA SW Multi-Family	Home Energy Savings Multi-Family	Focus on Energy Apt & Condo	EnergyWise Multi-Family	Seattle Multi-Family
Period Reviewed	Jan – Dec 2002	Jan – Dec 2002	July – Dec 2003	Sept 2002 – August 2003	Jan – Dec 2002	Jan – Dec 2000
Net to Gross Ratio	NA	0.89	NA	NA	0.78	NA
Free-ridership Rate	NA	NA	NA	NA	3%	0
Total Resource Cost/Societal Test	2.08	1.71[2]	1.22 (societal)[1]	NA	NA	NA
Average measure lifetime (years)	NA	Varies (9-20 years)[6]	NA	15	14	Varies
Program Budget	$581,300	$5,548,918[4]	$1,000,000	$5,051,000	$2,255,000	$1,167,000
Total Incentives Paid	$423,700	$3,864,152	$750,000 ($239,530)[3]	$2,171,000	NA	$791,214
Net MWh (Annual)	3,121	10,044	7,000 (2,578)[3]	12,963	2,706	2,404[5]
Net kW (Annual)	2,082	1,853	NA	2,391	Winter: 400 Summer: 600	NA
Therms Reduction	NA	517,456	NA	1,031,053	NA	NA
Real Discount Rate	NA	8.15%	3%	NA	5.35%	NA
Budget Per Impact						
Program Dollars per first-year kWh saved	$.19	$.55	$.14	$.4	$.82	$.49
Incentive Dollars per first-year kWh saved	$.14	$.38	$.10	$.17	NA	$.33
Non-Incentive $ per first-year kWh saved	$.05	$.17	$.036	$.22	NA	$.16

1. Utility Cost Test value = 2.38
2. Total Resource Cost Test value varied by implementing utility. PG&E = 1.39, SCE = 2.38, SCG = 1.51, and SDG&E = 1.56. 1.71 is the simple average of the implementing utilities.
3. These numbers represent actual installed incentives and actual achieved kWh, excluding committed projects. Using these numbers, incentive dollars per kWh =$.10
4. Actual expenditures
5. Seattle energy savings numbers represent projects completed in 2000: 1,970 MWh in Standard- Income projects and 434 MWh in Common- Area Lighting projects.
6. Electric lighting measures dominated the 2002 program for all utilities but SCG. Effective useful life (EUL) ranged from 20 years for fixtures and insulation to 18 years for HVAC measures and 9 years for screw-in light bulbs.

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APPENDIX R5A – BRIEF INTRODUCTION TO THE NATIONAL ENERGY EFFICIENCY BEST PRACTICES STUDY

INTRODUCTION

This report presents results of a comparative analysis of residential multi-family comprehensive programs included in the National Energy Efficiency Best Practices Study ("Best Practices Study"). The overall Best Practices Study objectives, scope, and methodology are briefly outlined in this Appendix. More details on methods and cross-program findings are provided in separate report volumes.

OBJECTIVE AND SCOPE

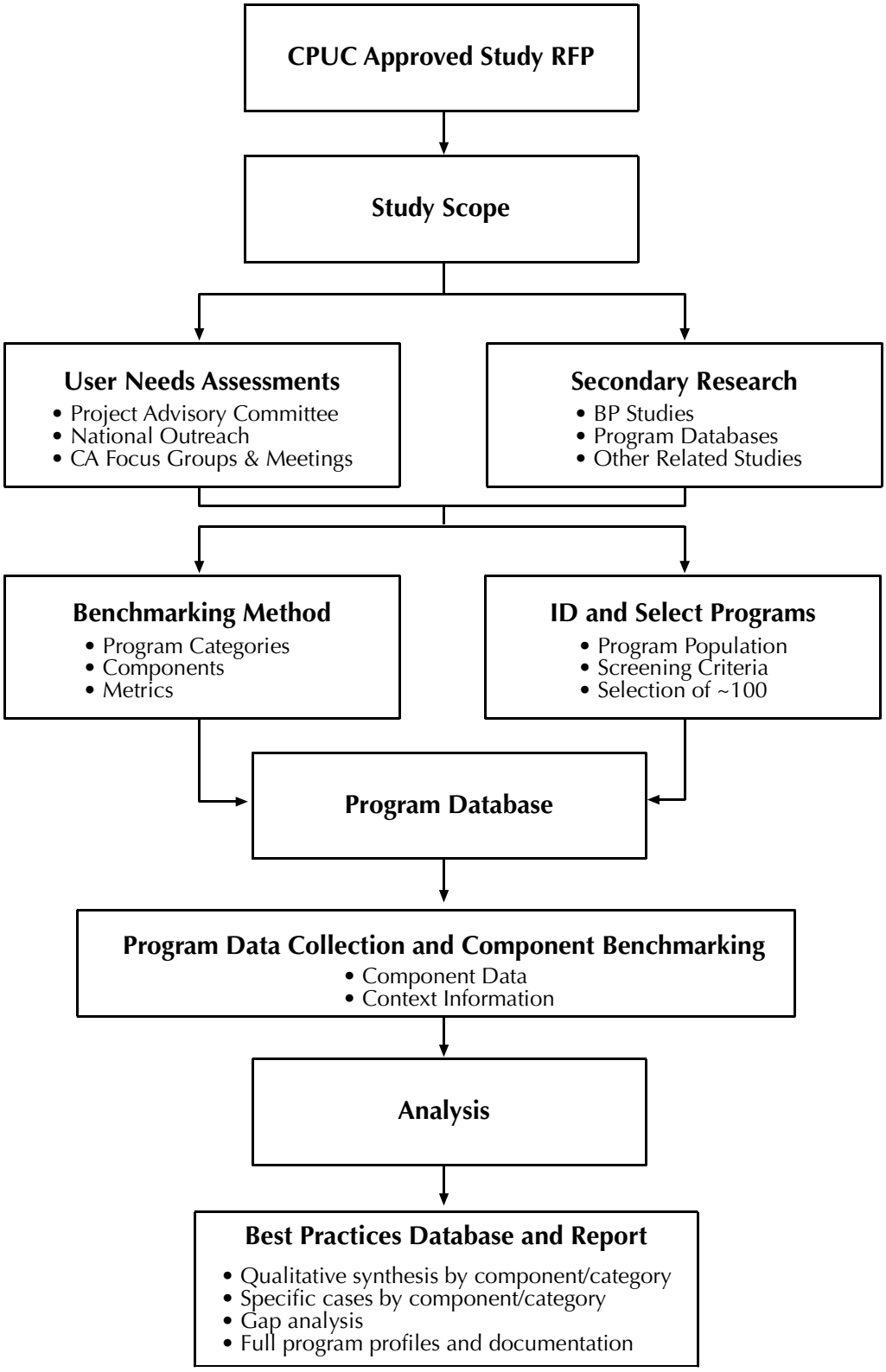
The overall goal of the Best Practices Study is to develop and implement a method to identify and communicate excellent energy efficiency program practices nationwide in order to enhance the design of such programs in California. In particular, program implementers supported through public goods funds are encouraged to use the Best Practices Study's products, along with other resources and their own knowledge and experience, to develop and refine energy efficiency programs.

The Best Practices Study is intended as a first-order effort to identify successful program approaches through systematic cross-program data collection and comparative analyses. It is not intended to produce a census of best practices across all types of programs. Such an approach would be neither practical nor useful given the number of programs that exist; the many differences in policies, goals, and market conditions around the country; the unique needs and market conditions in California; and the importance of encouraging innovation, which by its nature sometimes requires attempting approaches that are not yet proven. If the framework and results of the Best Practices Study prove useful, future phases of the work can expand the number and types of programs covered.

METHODOLOGY

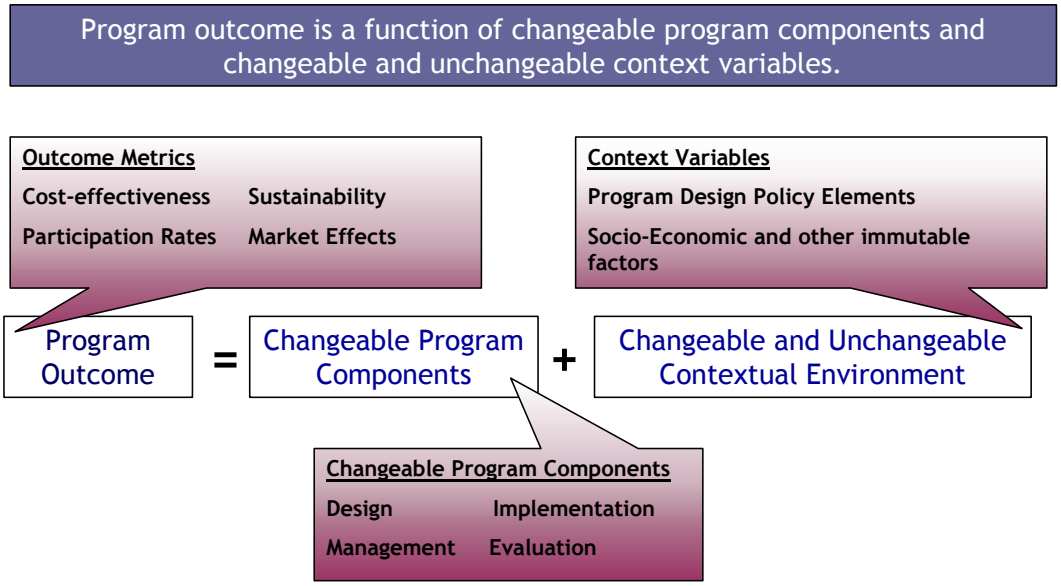
Key aspects of the Best Practices Study include a user needs assessment, secondary research, development of the benchmarking methods, identification and selection of programs to benchmark, development of the program database, data collection and program benchmarking, analysis, and preparation of the best practices report and final database. In addition, outcome metrics will be tracked. An overview of the Best Practices Study key activities is shown in Exhibit R5-9 below.

Exhibit R5-9
Overview of Energy Efficiency Best Practices Study



As shown below in Exhibit R5-10, the outcome of a program – as measured by $ per kWh saved, market penetration or sustainability – can be thought to be a function of changeable program elements, changeable portfolio-level design and programmatic policy decisions, and unchangeable social, economic, demographic, climate, and other factors. All of these factors can influence the ultimate success of an energy efficiency program. Some program elements (such as marketing, tracking or customer service) are directly controllable at the program level and can be modified to affect the success of the program. Other elements (such as the program policy objectives and whether the program has a single- or multi-year funding commitment) may not be changeable at the program level but may be changeable at a policy level. Other elements (such as the physical climate or density of the customer base) are not changeable and cannot be affected by program managers, implementers or policy-makers.

Exhibit R5-10
Relationship Among Program Outcomes, Components, and Context



PROGRAM CATEGORIES

A program category is defined for the Best Practices Study as the basis for grouping "like" programs to compare across components and sub-components. Program categories may be defined in any number of ways, for example, as a function of target market (e.g., sector, vintage, segment, end-use, value chain, urban/rural); approach (e.g., information-focused, incentive-focused (prescriptive, custom/performance-based)); objective (e.g., resource acquisition, market transformation, equity), and geographic scope (e.g., local, utility service territory, state, region, nation); among other possible dimensions.

A number of criteria a good program categorization strategy should address were identified and include user accessibility, benchmarking compatibility, potential, compatibility with policy guidelines, and compatibility with scope directives**.** The number of program categories was limited to approximately 17 to conform to resource constraints. These are shown in Exhibit R5-11 below. The final scheme separates residential from non-residential programs, and distinguishes between incentive programs, information and training programs and new construction programs. Programs are also segregated based on targeted end-use and customer type. A Crosscutting section is included to address comprehensive programs that do not cleanly fall within the other 16 categories. Each program category has an associated code, which is used throughout the Best Practices Study for identification purposes (e.g., R5 Programs = Residential Multi-Family Comprehensive Programs reviewed for the Best Practices Study).

Exhibit R5-11
Program Categories & Related Codes

Program Category			Code
Residential	Incentives	Lighting	R1
		Air Conditioning	R2
		Appliance and Plug Load	R3
		Single-Family Comprehensive	R4
		Multi-Family Comprehensive	R5
	Information & Training	Whole House Audit with no/minimal incentive	R6
		General & Other Comprehensive	R7
	New Construction Information & Incentives		R8
Non-Residential	Incentives	Lighting	NR1
		HVAC	NR2
		Refrigeration, Motors, Compressed Air, Process	NR3
		Small Comprehensive	NR4
		Large Comprehensive	NR5
	Information & Training	End-Users	NR6
		Trade Allies	NR7
	New Construction Information & Incentives		NR8
Other	Crosscutting		O1

PROGRAM SELECTION

Programs reviewed for each of the program categories in the Best Practices Study were selected through a three step process. First, programs were nominated using recent best practice studies, team member recommendations. Next programs were randomly selected from published data on energy programs to complete the roster. The third step involved conducting outreach interviews with the staff of nominated programs to determine if sufficient information was available to conduct the research. With the final set of programs determined, in-depth interviews were conducted.

PROGRAM COMPONENTS

The Best Practices Study approach focuses on analyzing programs primarily from the perspective of their changeable program characteristics. The Best Practices Team developed a method for breaking programs down into components and sub-components in order to systematically identify and compare specific program features of importance to overall program success. The four primary program components are program design, program management, program implementation, and program evaluation. These components and their associated sub-components are briefly summarized below.

- **Program Design** provides the initial foundation for a successful program. The program design category has two sub-components: **program theory** and **program structure** (which includes policies and procedures). Good program design begins with good program theory and a complete understanding of the marketplace. Good program structure, policies and procedures are necessary to translate program design theories and goals into practical and effective management and implementation actions.

- **Program Management** is the command and control center that drives the implementation process, and may be broken down into the sub-components of **project management**, **reporting and tracking**, and **quality control and verification**. Project management includes the structure and relationship among responsible parties. Reporting and tracking focuses on approaches to identifying and tracking useful and appropriate metrics that can be translated efficiently into reporting effective information. Quality control and verification includes accountability and improvement processes that are typically carried out through implementation and evaluation activities.

- **Program Implementation** is defined by the actual activities carried out in the marketplace to increase adoption of energy efficiency products and practices. Its sub-components include **outreach, marketing, and advertising**, the **participation process**, and **installation and incentive** mechanisms. Good outreach, marketing and advertising efforts should result in relatively high program awareness, knowledge of program specifics, and participation levels. The participation process is a critically important element of a program's ultimate success. Standard measures of market penetration and customer satisfaction provide one indication of a program's effectiveness at enrolling customers and processing their applications. Installation and incentives should demonstrate evidence of installation and delivery follow-through on marketing and outreach efforts.

- **Evaluation and Adaptability** of programs should also be analyzed. The Best Practices Study assesses the adequacy of evaluation efforts and how programs use evaluation results or other feedback mechanisms to improve over time.

DATA COLLECTION

Program information was gathered using primary and secondary sources. Primary data was collected largely through surveys of program managers and review of regulatory filings, annual reports and program evaluations. The Best Practices Team conducted extensive interviews with

program managers using a detailed survey instrument to guide the conversations. The survey instrument collected information on three main areas: policy context and environment, outcome metrics, and information about program components. The first set of questions elicited responses on how the program might have been affected by the broader context in which it operates. Next, respondents provided information on outcome metrics, such as program impacts and costs. The remainder of the instrument was devoted to collecting detailed program information for each program component. For each component, respondents were asked to provide factual information on how the program addressed each issue and qualitative judgments about what practices they felt contributed to the success of this program and what practices should have been avoided or could be improved.

STRUCTURE OF REPORTING

Complete project results are provided in project reports and a Web site that allows users to access information at varying levels of depth, including top-line summaries by program type or component, stand-alone chapters on best practices by program area, documentation of project methods and individual program profiles.