ES. EXECUTIVE SUMMARY FOR
RESIDENTIAL NEW CONSTRUCTION PROGRAM AREA (R8)

ES.1   INTRODUCTION

This volume presents results of a comparative analysis of residential new construction 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 R8A 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 seven residential new construction programs for this program area study ("R8 Programs" and "R8 Study," respectively), each of which has the goal of capturing energy efficiency gains through increased attention to integrated design and overall construction quality. All R8 Programs focused on whole-building performance, though several programs also included technology-specific requirements or incentives.

The R8 Programs are listed in Exhibit R8-E1 below and presented in the body of this report. A discussion of the program selection process is provided in Appendix R8A.

ES.2   KEY CATEGORY THEMES

The R8 Programs all focused on whole-building performance. This focus reflects the fact that new construction presents a unique opportunity to capture energy efficiency gains through increased attention to integrated design and overall construction quality. Once a home is built, further cost-effective energy efficiency opportunities are limited to select technology upgrades, either as retrofits or as part of routine replacement.

Energy efficiency in new construction is a particular challenge to program designers because of the pervasive split incentive barrier (i.e., the party responsible for energy efficiency decisions is not the one who will ultimately reap related benefits). Most homes are built "on-spec" and sold to the eventual resident at or near completion. The home builder has no long-term interest in energy efficiency because he does not pay the energy bills. The occupant has an interest in energy efficiency but lacks a substantive role in the construction process. In principle, the split incentive could be bridged if the home builder were able to recoup the energy efficiency investment in the form of a higher sales price. But the home buyer generally lacks the technical skills to evaluate energy efficiency claims – and value - and must consider them in the context of a number of bundled home attributes that are usually more important to her.

In this context, the R8 Programs all adopted a strong market transformation emphasis, even when quantifying and offering incentives for direct energy impacts for resource acquisition purposes. The market transformation focus led to several program themes that transect program components: private sector support, combined supply-side/demand-side strategy, and program brand equity.

Private Sector Support - Active support from private sector stakeholders and trade allies was essential. Program managers emphasized the role of builders, contractors, and trade associations in designing programs, crafting marketing messages, and selling energy efficiency to home buyers.

Combined Supply-side / Demand-side Strategy - Program staff members worked closely with builders and contractors to improve the quality and availability of energy-efficient homes. They also offered extensive consumer education resources to stimulate market demand and help bridge the split incentive gap. A key component of the demand-side strategy was a high-profile market brand (usually ENERGY STAR®) that allowed home buyers to identify energy-efficient homes without first developing the technical expertise to evaluate builder claims.

Program Brand Equity - Perhaps the most valuable program asset was the credibility of the program's market brand as an indicator of trustworthy and accurate information. The need to develop and protect brand equity drove project documentation requirements, the site inspection process, quality-control measures at all phases of program implementation, and impact evaluation objectives.

ES.3   BEST PRACTICES SUMMARY

Best practices are identified in the R8 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 R8-E2 presents the list of best practices developed from the analysis of R8 Programs. For this program area, some specific lessons learned around the program participation process were also identified. These lessons are provided in Exhibit R8-E3. Exhibit R8-E4 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 Residential New Construction Program is in progress and will be published when complete in a separate document.

Program Name	Implementer/s	Abbreviation for R8 Report
2001-2002 Austin Green Building Program	Austin Energy	Austin Green Building
2002 California ENERGY STAR New Homes 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 ENERGY STAR New Homes
2002 New Jersey ENERGY STAR Homes	Clean Energy for New Jersey	NJ ENERGY STAR Homes
2002 Texas ENERGY STAR Homes Program	Oncor	TX ENERGY STAR Homes
2002 Tucson Guarantee Home Program	Tucson Electric Power	Tucson Guarantee Home
2001 Vermont ENERGY STAR Homes	Efficiency Vermont	VT ENERGY STAR Homes
2001-2002 Wisconsin ENERGY STAR Program	Wisconsin Energy Conservation Corporation (WECC)	WI ENERGY STAR

Exhibit R8-E2
Summary List of Best Practices for Residential New Construction Programs

Program Theory and Design
• Have a well-articulated theory or program logic • Link program tactics to the stated theory • Plan thoroughly • Involve multiple stakeholders • Build feedback loops into the program design • Maintain program design flexibility • Understand local market conditions • Use targeted incentives • Focus first on developing supply-side capacity • Do not over-promise results
Program Management: Project Management
• Include stakeholders in developing a program process or operational plan • Put the process plan in writing • Keep management teams small • Maintain good staff morale • Make sure at least some of the institutional memory resides in-house, not with subcontractors • Avoid giving a single contractor exclusive responsibility for program implementation • Provide staff with good training that matches skill needs • Reward high performing staff and link performance evaluations to tangible measures which are known in advance and developed together jointly by the manager and employee • Match staff decision-making authority to responsibilities and delegate responsibility and authority to avoid institutionalized bottlenecks • Get upper management buy-in
Program Management: Reporting and Tracking
• Define and identify the key information needed to track and report early in the program development process • Minimize duplicative data entry; link databases to exchange information dynamically • Track market transformation program qualitative benefits and measures related to spillover effects, along with direct savings impacts • Develop accurate algorithms and assumptions on which to base estimates of savings • Design databases to be scalable to accommodate changes in program scope • Use the Internet to facilitate data entry and reporting • Automate routine functions such as monthly reports • Build in rigorous quality control screens for data entry • Document the tracking system carefully

Program Management: Quality Control and Verification
• Treat inspection visits as partnership-building & learning events rather than just regulatory enforcement activities • Require builder or builder's representative to be on-site during inspection • Plan to rely on third-party inspectors for quality control over the long-term • Encourage home inspectors to organize their own professional organization • Provide timely feedback to builders, home inspectors, and other parties • Ensure that inspectors have plenty of hands-on construction experience • Establish a streamlined inspection scheduling process • Recognize the different inspection needs of experienced builders and builders who are new to the program • Host pre-construction meetings with the builder, key subcontractors, and suppliers to review project specifications and program requirements
Program Implementation: Participation Process
• Establish a robust program brand to differentiate energy-efficient homes from conventional homes • Offer assistance in preparing and submitting program applications • Minimize documentation requirements that would entail preparing new documents not already developed in the course of project permitting • Use targeted incentives • Link incentives to building performance requirements • Establish minimum requirements for builders • Build strategic alliances with equipment manufacturers and encourage them to add their own incentives • Target measure incentives to home buyers to encourage them to ask for the higher efficiency equipment • Solicit home inspector input when developing ethics guideline and customer service standards • Encourage home inspectors to take over training functions • Develop a technical and procedural manual for builders • Avoid vague or inconsistent technical standards that do not take into account broader building performance implications • Offer a bill guarantee • Extend program construction standards beyond energy features
Program Implementation: Marketing and Outreach
• Market to multiple departments within volume builder organizations • Take information to builders – use a "push" rather than "pull" marketing approach • Know your target consumer demographic, tailor your message to the audience and develop effective cross-marketing strategies • Combine point-of-sale marketing via builder sales agents with direct marketing to home buyers • Give builders an opportunity to participate in developing marketing messages
Program Evaluation
• Support program review and assessment at the most comprehensive level possible • Ensure that evaluation metrics are in-line with program goals • Clearly explain evaluation roles and responsibilities to participants in advance • Select an evaluator who has a detailed understanding of the market context in which a program operates • Allow for plenty of interaction between evaluators and implementation staff • Ensure the clarity of the evaluation document • Periodically review and update market-level information about construction practices and energy efficiency measure adoption • Periodically review and update algorithms for calculating project savings

Residential New Construction Programs Lessons Learned – Participation Tactics

Participation Tactic	Lessons Learned
Financial Incentives	• Useful for overcoming builder resistance but not absolutely required • Most useful for off-setting financial impacts of inspection requirements • More mature programs can reduce incentive levels, based on demonstrated market value of homes built and certified to program standards
Program Membership	• Builder participation is key • Participation from architects and contractors also useful
Membership Requirements	• Require builder to sign ENERGY STAR Partnership Agreement or other pledge to build to program standards • On-going training requirements for builders, architects, and contractors add value
Design Review	• Offer design assistance to help builders trouble-shoot problematic designs and improve overall home performance at a stage where changes are still cost-effective • Assist with building energy simulations, life cycle cost analysis, Manual J calculations
On-site Inspections	• Inspect mechanical rough-in and final for sampled projects • Design sampling protocol to ease inspection burden on experienced builders with demonstrated track record of performance • Include performance tests, i.e., duct test, pressure test, blower door test
Cooperative Advertising	• Promote program builders by name • Solicit builder input on marketing messages and strategy • Train builder's sales staff
Certification Requirements	• Home certification and labeling is essential for overcoming split incentives and asymmetric information barriers • Certification requires clear-cut inspection process to protect program credibility and brand equity
Technical Assistance	• Offer regular training opportunities • Encourage rates to offer technical assistance as part of inspections, i.e., emphasize role as builder's ally rather than rule enforcer • Engage raters in providing training courses for builders, contractors, architects
Bill Guarantee	• Utility's performance guarantee is effective at overcoming home buyer's uncertainty about expected performance • Bill guarantee provides builder with additional marketing tool, thus creating additional incentive to undergo inspections, document HVAC sizing calculations, and other program requirements • Properly structured bill guarantee creates minimal financial risk for utility

Exhibit R8-E4
Summary of Best Practices Rationales for Residential New Construction Programs

Best Practice	Rationale
Program Theory and Design	
Have a well-articulated theory or program logic	Helps identify any gaps in program focus or effort and assures that everyone involved understands program objectives.
Link program tactics to the stated theory	Assures that programs are fundable, feasible, and capable of being evaluated.
Plan thoroughly	A detailed, well thought-out plan is easier to present and explain to potential critics.
Involve multiple stakeholders	Include potential program beneficiaries, trade allies, and regulators / policy makers to get their buy-in and support.
Build feedback loops into the program design	Assures that stakeholders continue to provide input throughout program implementation.
Maintain program design flexibility	Program must be able to respond to changing market conditions and address unforeseen challenges throughout program implementation.
Understand local market conditions	Important for recognizing which lessons from other areas transfer to the local market and which ones do not; objective baseline market research bolsters design credibility.
Use targeted incentives	Help establish the program's credibility in the minds of private-sector market actors who may be reluctant to be the first to try something new.
Focus first on developing supply-side capacity	Program credibility will be undermined if program promises something to consumers it cannot deliver.
Do not over-promise results	Overly optimistic promises may attract more interest early on but they set the stage for disappointment later.

Best Practice	Rationale
Program Management: Project Management	
Include stakeholders in developing a program process or operational plan	Bolster the plan's credibility, produce a plan that reflects local market conditions, and address needs of stakeholders with divergent viewpoints.
Put the process plan in writing	A written plan is more likely to be a well thought-out plan and is easier to disseminate to the various affected stakeholders.
Keep management teams small	Small teams allow for maintaining close coordination, facilitating good communication, and increasing the likelihood of reaching consensus.
Maintain good staff morale	Ensure staffing stability and develop long-term institutional memory.
Make sure at least some of the institutional memory resides in-house, not with subcontractors	Avoid exclusive reliance on subcontractors for advice on key policy issues.
Avoid giving a single contractor exclusive responsibility for program implementation	Stimulate competition, provide a basis for accountability, and build in redundancy in the event any one contractor fails to perform.
Provide staff with good training that matches skill needs	Program services will only be as good as the people who deliver them. Human resources are as important to program success as financial resources.
Reward high performing staff and link performance evaluations to tangible measures which are known in advance and developed together jointly by the manager and employee	Staff will perform better when they clearly understand what is expected of them and they agree that the expectations are reasonable.
Match staff decision-making authority to responsibilities and delegate responsibility and authority to avoid institutionalized bottlenecks	Prerequisite for performance expectations that are perceived as reasonable.
Get upper management buy-in	Residential new construction programs require several years to generate tangible impacts. Upper management must embark on the process with patience, reasonable expectations, and a commitment to fund the entire start-up phase

Best Practice	Rationale
Program Management: Reporting and Tracking	
Define and identify the key information needed to track and report early in the program development process	Clearly articulated data requirements enhance the prospects that those requirements will be met.
Minimize duplicative data entry; link databases to exchange information dynamically	Minimize redundant data entry efforts, reduce inconsistencies.
Track market transformation program qualitative benefits and measures related to spillover effects, along with direct savings impacts	If program rationale is to generate market effects, those effects must be tracked to determine program success.
Develop accurate algorithms and assumptions on which to base estimates of savings	Help set reasonable expectations and avoid the temptation to oversell program benefits.
Design databases to be scalable to accommodate changes in program scope	Enhance the program's overall flexibility and ability to respond to unforeseen market conditions.
Use the Internet to facilitate data entry and reporting	Enhance the quality and cost-effectiveness of information management; help minimize duplicative data entry and storage and automate many routine quality-control steps.
Automate routine functions such as monthly reports	Build in quality control checks and free up staff time for more strategically important tasks.
Build in rigorous quality control screens for data entry	Minimize the extent of subsequent data cleaning and enhance the accuracy and credibility of reported results.
Document the tracking system carefully	Help mitigate problems stemming from staff turnover, especially when the system must serve a variety of users with varying computer skill levels.
Program Management: Quality Control and Verification	
Treat inspection visits as partnership-building and learning events rather than just regulatory enforcement activities	Rater should be builders' ally for quality control.

Best Practice	Rationale
Require builder or builder's representative to be on-site during inspection	Demonstrate the value of the inspection and reinforce the notion of the inspection as a training/education opportunity rather than program enforcement.
Plan to rely on third-party inspectors for quality control over the long-term	Builder self-certification provides too many opportunities for abuses that undermine brand equity and consumer confidence in program claims.
Encourage home inspectors to organize their own professional organization	Harness market forces to provide monitoring and quality control.
Conduct follow-up inspections of selected project	Provide quality control of rater's results and assess the program's influence on the project.
Provide timely feedback to builders, home inspectors, and other parties	Respect builder and contractor time constraints; capture one-time opportunities for positive program impacts.
Ensure that inspectors have plenty of hands-on construction experience	Essential if raters are to fill role of teachers and mentors
Establish a streamlined inspection scheduling process	Avoid imposing hidden costs on program participants in the form of project delays.
Recognize the different inspection needs of experienced builders and builders who are new to the program.	Newer builders need more attention to master the details of quality construction.
Host pre-construction meetings with the builder, key subcontractors, and suppliers to review project specifications and program requirements	Establish clear communication with the builder and demonstrate the importance of good planning.
Program Implementation: Participation Process	
Establish a robust program brand to differentiate energy-efficient homes from conventional homes.	Brands help capture the market value of energy efficiency and permit home buyers to identify more energy-efficient homes without mastering the technical details of home construction practices.
Offer assistance in preparing and submitting program applications	The level of documentation required to demonstrate whole-building performance can be significant. Minimize barriers to participation.

Best Practice	Rationale
Minimize documentation requirements that would entail preparing new documents not already developed in the course of project permitting	Help minimize the administrative burden associated with program participation.
Use targeted incentives	Help establish the program's credibility in the minds of private-sector market actors who may be reluctant to be the first to try something new.
Link incentives to building performance requirements	Performance-based incentives provide more project design flexibility than prescriptive incentives.
Establish minimum requirements for builders	Protect and enhance program's market reputation as a trustworthy arbiter of quality and energy efficiency.
Build strategic alliances with equipment manufacturers and encourage them to add their own incentives	Leverage existing market forces to enhance and extend program effectiveness.
Target measure incentives to home buyers to encourage them to ask for the higher efficiency equipment	Particularly useful for technology choices that are frequently left to the buyer, such as light fixtures and appliances.
Solicit home inspector input when developing ethics guideline and customer service standards	Produce guidelines that will be respected and followed rather than ignored.
Encourage home inspectors to take over training functions	Create opportunities for professional advancement as a rater, capitalize on raters' field experience.
Develop a technical and procedural manual for builders	Make participation straightforward, routine, and predictable; reduce the degree of "hand-holding" program staff must provide.
Avoid vague or inconsistent technical standards that do not take into account broader building performance implications	Make participation straightforward, routine, and predictable; reduce the degree of "hand-holding" program staff must provide.
Offer a bill guarantee	Could be a low-cost strategy for enhancing credibility of program benefit claims.

Best Practice	Rationale
Extend program construction standards beyond energy features	Coupling energy efficiency with other desirable building attributes can enhance program appeal. Limit claims to those that can be supported by building science and cost-effective increases in consumer demand.

Program Implementation Marketing & Outreach	
Market to multiple departments within volume builder organizations	Each department has an important role in the project. Lack of buy-in from any one department can undermine the effectiveness of other department efforts.
Take information to builders – use a "push" rather than "pull" marketing approach	Cannot wait for builders to come to you because they won't.
Know your target consumer demographic, tailor your message to the audience and develop effective cross-marketing strategies	Customer demographics vary widely by region and one-size does not fit all as a marketing strategy.
Combine point-of-sale marketing via builder sales agents with direct marketing to home buyers	Builders need to be convinced that improved energy efficiency can translate into added value at the point of sale.
Give builders an opportunity to participate in developing marketing messages	Take advantage of builders' accumulated marketing experience.
Program Evaluation	
Support program review and assessment at the most comprehensive level possible	Gain the most detailed understanding of program cause and effect that available resources and reporting requirements will support.
Ensure that evaluation metrics are in-line with program goals	The only way to assess program progress toward achieving predetermined goals is to establish metrics that measure that progress.

Best Practice	Rationale
Clearly explain evaluation roles and responsibilities to participants in advance	Avoid later confusion from having multiple parties contacting the participant for similar information.
Select an evaluator who has a detailed understanding of the market context in which a program operates	Enhance the value of evaluation findings for improving program delivery.
Allow for plenty of interaction between evaluators and implementation staff	Direct interaction gives the evaluator a clear understanding of program dynamics. Clear communication channels are essential.
Ensure the clarity of the evaluation document	Clearly describing program goals, strategies and lessons learned ensures that program staff, stakeholders and other interested parties may gain a good understanding of the program.
Periodically review and update market-level information about construction practices and energy efficiency measure adoption	Program design must reflect current market conditions. Program resources should not be expended to promote technologies and practices that are already widely adopted or standard industry practices.
Periodically review and update algorithms for calculating project savings	Savings algorithms should be reasonably calibrated with real-world building performance, which changes over time as construction practices and available technologies change.