



Customer Incentives for Energy Efficiency Through Program Offerings

A RESOURCE OF THE NATIONAL ACTION PLAN FOR
ENERGY EFFICIENCY

FEBRUARY 2010

The Leadership Group of the National Action Plan for Energy Efficiency is committed to taking action to increase investment in cost-effective energy efficiency. *Customer Incentives for Energy Efficiency Through Program Offerings* was developed under the guidance of and with input from the Leadership Group. The document does not necessarily represent a consensus view and does not represent an endorsement by the organizations of Leadership Group members.

Customer Incentives for Energy Efficiency Through Program Offerings is a product of the National Action Plan for Energy Efficiency and does not reflect the views, policies, or otherwise of the federal government. The role of the U.S. Department of Energy and U.S. Environmental Protection Agency is limited to facilitation of the Action Plan.

If this document is referenced, it should be cited as:

National Action Plan for Energy Efficiency (2010). *Customer Incentives for Energy Efficiency Through Program Offerings*. Prepared by William Prindle, ICF International, Inc. <www.epa.gov/eeactionplan>

For More Information

Regarding *Customer Incentives for Energy Efficiency Through Program Offerings*, please contact:

Stacy Angel
U.S. Environmental Protection Agency
Office of Air and Radiation
Climate Protection Partnerships Division
Tel: (202) 343-9606
E-mail: angel.stacy@epa.gov

Regarding the National Action Plan for Energy Efficiency, please contact:

Stacy Angel
U.S. Environmental Protection Agency
Office of Air and Radiation
Climate Protection Partnerships Division
Tel: (202) 343-9606
E-mail: angel.stacy@epa.gov

Larry Mansueti
U.S. Department of Energy
Office of Electricity Delivery and Energy Reliability
Tel: (202) 586-2588
E-mail: lawrence.mansueti@hq.doe.gov

or visit www.epa.gov/eeactionplan

Table of Contents

List of Figures	ii
List of Tables.....	ii
List of Abbreviations and Acronyms.....	ii
Acknowledgements.....	ii
Executive Summary	1
Customer Incentives for Energy Efficiency Through Programs	1
Key Findings	1
Key Questions to Ask Regarding Customer Incentives in Program Design.....	3
Achieving All Cost-Effective Energy Efficiency—A Vision for 2025	4
Customer Incentives for Energy Efficiency Through Program Offerings	5
Basic Concepts and Issues.....	5
Program Theory and Design: The Basis for Efficiency Program Incentives	8
Incentive Design Options	12
Program Experience: Summary of Incentives Offered in Best-Practice Programs	17
Considerations in Reviewing, Designing, and Implementing Program Incentives	25
Key Questions to Ask Regarding Customer Incentives in Program Design.....	26
Notes.....	27
Appendix A: National Action Plan for Energy Efficiency Leadership Group	A-1
Appendix B: References.....	B-1

List of Figures

Figure 1. Overview of Energy Efficiency Incentive Types.....	2
--	---

List of Tables

Table 1. Incentive Types and Levels of Market Intervention.....	7
Table 2. Illustrative Program Theory Examples: Key Stakeholders, Barriers, and Program Strategies by Customer Segment	8
Table 3. Comparative Impacts of Incentive Types	14
Table 4. Summary of Incentives Offered in Current Programs	18

List of Abbreviations and Acronyms

ARRA	American Recovery and Reinvestment Act of 2009
CFL	compact fluorescent lamp
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
HVAC	heating, ventilation, and air conditioning
LED	light-emitting diode
LIHEAP	Low-Income Home Energy Assistance Program
NGO	nongovernmental organization
WAP	Weatherization Assistance Program

Acknowledgements

This brief, *Customer Incentives for Energy Efficiency Through Program Offerings*, is a key product of the Year Four Work Plan for the National Action Plan for Energy Efficiency. This work plan was developed based on Action Plan Leadership Group discussions and feedback expressed during and in response to the January 2009 Leadership Group Meeting. A full list of Leadership Group members is provided in Appendix A and at www.epa.gov/eeactionplan.

With direction and comment by the Action Plan Leadership Group, the paper was developed by Bill Prindle of ICF International, Inc. Rich Sedano of the Regulatory Assistance Project and Alison Silverstein of Alison Silverstein Consulting provided their expertise during review and editing of the brief.

The U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE) facilitate the National Action Plan for Energy Efficiency. Key staff include Larry Mansueti (DOE Office of Electricity Delivery and Energy Reliability), Kathleen Hogan and Katrina Pielli (DOE Office of Energy Efficiency and Renewable Energy), and Stacy Angel and Maureen McNamara (EPA Climate Protection Partnerships Division).

Eastern Research Group, Inc., provided copyediting and production services.

Executive Summary

This brief, Customer Incentives for Energy Efficiency Through Program Offerings, summarizes the approaches used by energy efficiency program administrators when assessing incentives to be used in energy efficiency programs. The scope of this brief is limited to financial incentives and services offered through public policy-driven programs aimed primarily at utility customers. It is provided as part of a comprehensive suite of papers and tools to assist organizations in meeting the National Action Plan for Energy Efficiency goal of achieving all cost-effective energy efficiency by 2025.

Improving energy efficiency in our homes, businesses, schools, governments, and industries—which consume more than 70 percent of the natural gas and electricity used in the country—is one of the most constructive, cost-effective ways to address the challenges of high energy prices, energy security, air pollution, and global climate change. Despite these benefits and proven approaches, energy efficiency remains critically underutilized in the nation’s energy portfolio. Regulators can address this problem in part by removing one of the persistent barriers to energy efficiency by creating effective customer incentives for energy efficiency through program offerings.

Customer Incentives for Energy Efficiency Through Programs

Energy efficiency programs provide a range of financial and other incentives to encourage investments in energy-efficient technologies, related services, and/or behavior change. These incentives range from simple cash rebates for the purchase of efficient products to bundled customized financial incentives and technical assistance. Incentives can be targeted to individual customers and purchase transactions, or can be directed further upstream in market supply chains to encourage manufacturers, retailers, or contractors to affect how customers choose products, building designs, or building operating methods. An overview of incentive types is provided in Figure 1, with further discussion provided in the brief.

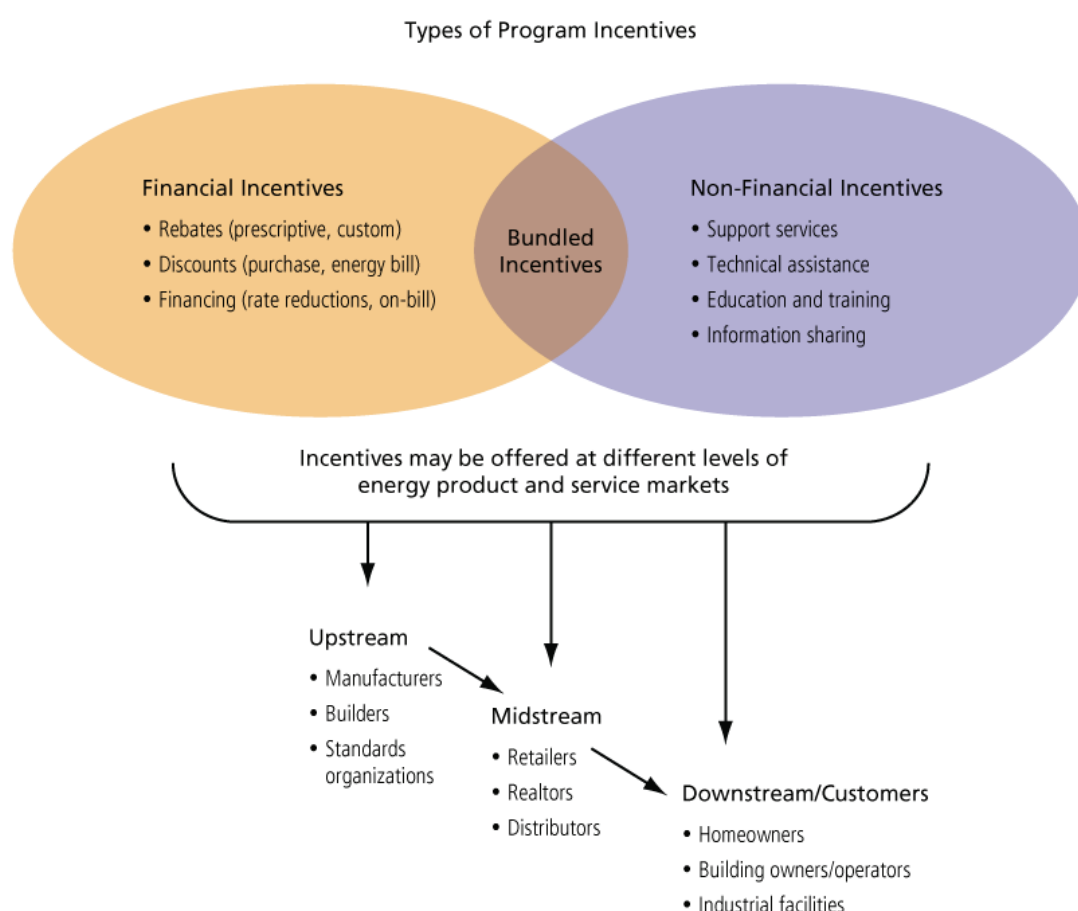
Key Findings

- Most efficiency programs have used direct financial incentives—rebates and other forms of direct subsidy for individual customers and transactions.
- Incentives are also commonly directed to upstream and midstream channel partners or trade allies such as retailers, contractors, manufacturers, and distributors.
- Incentives can be used in conjunction with other program strategies to achieve market transformation, whereby there is a lasting change in the availability and demand for energy-efficient goods and services.
- Managing efficiency programs through portfolios allows program administrators to match incentive types and program features to different customer types and market needs. Portfolios can evolve over time, from simpler and fewer incentive types early on to more feature-rich and diverse incentives and services later on.
- Program administrators meeting aggressive energy savings targets are “pushing the envelope” of incentive and program design, providing bundled sets of financial incentives

and other services designed to obtain deeper savings per customer and produce wider and longer-lasting market effects.

- Some markets continue to be appropriate for simple, direct incentive approaches.
- New research and program pilots are underway to better understand emerging, innovative incentive approaches, including whole-building performance-based incentives and incentives designed to change customer behavior and decision-making, beyond targeting product purchase transactions.

Figure 1. Overview of Energy Efficiency Incentive Types



Key Questions to Ask Regarding Customer Incentives in Program Design

When reviewing program plans, asking the following questions can help get at the key issues that can make a difference between successful and unsuccessful offerings:

- Are the incentives and other program strategies based on a clear, logical program theory that identifies barriers in the target market and designs incentives and other strategies to reduce those barriers?
- Is the program theory based on, and validated by, a detailed market assessment that examines key market actors and decision-making processes?
- Is the program part of a wider portfolio of energy efficiency programs, and if so does it provide appropriate incentives within the portfolio's context? Are incentive levels and other services appropriate for the developmental cycle of the program and the wider portfolio?
- Does the program design consider and seek to leverage other incentive options, such as federal, state, or local tax incentives, or other programs or services?
- Are incentives and other program strategies proven to be effective elsewhere? Has the program designer provided solid evidence of its success in other markets?
- Are incentive and other program strategies appropriate to the climate, customer mix, and local market characteristics?
- Did program designers consult customers and trade allies in designing incentives and other program features?
- Are customer incentives part of a complete program plan, including infrastructure development, marketing, and program implementation and evaluation?
- What may be the unintended consequences of providing the incentives? Can program strategies be designed to reduce any potential negative consequences?
- Is the proposed program or portfolio cost-effective when applying the jurisdiction's applicable cost-effectiveness tests?

Achieving All Cost-Effective Energy Efficiency—A Vision for 2025

This brief has been developed to help parties pursue the key policy recommendations of the National Action Plan for Energy Efficiency and its Vision for 2025 implementation goals. It directly supports Vision Implementation Goal Five, which encourages program regulators and administrators to establish effective energy efficiency delivery mechanisms.

Within this context, state public utility commissions, publicly governed utility boards, public energy agencies, independent third-party administrators, and utility companies are encouraged to consider how the financial incentives and related services they provide to customers can be part of the comprehensive solution to energy efficiency. For information on the full suite of policy and programmatic options to remove barriers to energy efficiency, see the Vision for 2025 and other Action Plan resources available at www.epa.gov/eeactionplan.

Customer Incentives for Energy Efficiency Through Program Offerings

This brief summarizes 20-plus years of U.S. experience with energy efficiency programs offering incentives to utility customers. This experience spans the majority of states, as well as a range of customer end-use markets, incentive types, and associated program services. This brief seeks to distill best practices for the principal customer markets and incentive types, and also seeks to examine current trends in effective bundling of incentives with other services for targeted markets. Discussed are:

- Basic concepts and issues to help explain incentive types and how they are used
- The use of program theory to assist in designing customer incentives
- Examples of how incentives are applied in different market and program settings
- Experience from the field
- Guidance on key implementation issues

This brief does not go into detail on specific program examples or broader energy efficiency program issues, nor does it address regulatory issues such as cost-effectiveness, cost recovery, or shareholder incentives, except as they affect incentive or program design. These issues are addressed in other Action Plan documents.¹ The rates customers pay for electricity and gas supply also motivate customers to change their energy use, which is addressed in an Action Plan brief titled *Customer Incentives for Energy Efficiency Through Electric and Natural Gas Rate Design* (National Action Plan for Energy Efficiency, 2009).

Basic Concepts and Issues

This section provides definitions and a conceptual overview of the context for customer energy efficiency incentives. For the purposes of this brief, the term “**customer energy efficiency incentive**” refers to an offering from an efficiency program administrator intended to encourage or motivate customers to reduce the total amount of energy they consume for a given level of energy service provided, without compromising the quality or level of service. Resulting energy efficiency actions could be investments in energy-efficient technologies and practices and/or changes in customer behavior. The terms “motivate,” “encourage,” and “incent” may be used interchangeably. Other key terms used in this brief are defined as follows:

- **Direct incentives** refer to **direct payments or subsidies** to individual customers for the purchase or installation of a specific energy efficiency measure. Examples include:
 - **Rebates.** A rebate is a payment from the program sponsor to an individual customer, typically made after a qualified item is purchased and a rebate coupon or application is submitted. Rebates can be **prescriptive** (fixed amounts pre-defined for specific products) or **custom** (defined by formulas or other rules that match the payment to a specific product or project).
 - **Discounts.** Discounts can be viewed as “instant” or upfront rebates, taken off the price of the product at the point of purchase. Discounts can also be structured as **reductions or credits on energy bills** rather than at the point of purchase.

-
- **Financing.** Offering financing such as loans to customers through the program can be an incentive to implement efficiency measures, especially for customers who may not easily qualify for conventional financing. But financing also introduces other players and other issues for program designers and operators, and should thus be undertaken with all due consideration. Incentives can also be added into financing through **interest rate reductions** (*which can be achieved through public-purpose bonds or other mechanisms*), flexible terms such as **extended payment periods**, and the convenience of **payment through utility bills or performance contracting**.
 - **Upstream/midstream incentives** are financial incentives that involve payments to parties that are “up the supply chain” from the individual customer purchase transaction. Upstream incentives reach relatively far up the supply chain, typically to manufacturers; midstream incentives are targeted closer to the customer end of the market, typically to retailers or installation contractors. Upstream/midstream incentives can affect larger markets than direct incentives targeted to individual customers, because upstream and midstream players are able to offer the desired products or services to all the customers they serve, not just those who learn about direct customer rebates.
 - This brief also addresses **non-financial incentives**, which may include:
 - **Technical services.** The many steps involved in identifying, developing, installing, and paying for efficiency improvements can create transaction-cost barriers, sometimes referred to as the “hassle factor.” Typical homeowners and business owners do not have the time and expertise to work through all these steps, and thus many worthy projects succumb to the “hassle factor.” Program services that help customers through this process can reduce the hassle and increase the installation rate. Some customers may know what they would like to do, but do not have the expertise to design or evaluate the project. Technical services can help customers bring an efficiency idea to fruition by developing the specifications needed to implement the project, as well as identifying the benefits and costs.
 - **Information services.** Many customers lack basic information on how efficient they are, what their options might be, and how to implement those options. Information services can reduce this chronic lack of information and guidance through training focused on particular skills or technology issues. Training can take many forms, from teaching sales staff to understand and sell the benefits of efficient products, to training building operators to run their buildings efficiently, and training building designers to use simulation software to evaluate efficient building designs.
 - Non-financial incentives/services may be **bundled** with direct or indirect incentives, or may be offered on a stand-alone basis. Depending on the customer type and market characteristics that a given program targets, an effective energy efficiency program design may include any one of these incentive types, or may bundle them together in various ways.

Table 1 provides a simplified visual framework of incentive types, market intervention levels, and examples.

Table 1. Incentive Types and Levels of Market Intervention

Incentive Type	Level of Market Intervention		
	Upstream	Midstream	Downstream
Financial ▪ Cash rebates ▪ Discounts ▪ Financing ▪ Tax credits	<i>Example:</i> Cash payment to manufacturers for making products that meet high-efficiency performance criteria	<i>Example:</i> Cash payments to retailers for promoting/ discounting high-efficiency products	<i>Example:</i> Cash rebate to customers who purchase efficient products
Non-Financial ▪ Technical services ▪ Information services	<i>Example:</i> Providing technical assistance to builders and developers to design buildings for high energy performance	<i>Example:</i> Providing point-of-purchase displays and information materials to support retailer promotions of high-efficiency products	<i>Example:</i> Helping customers develop efficiency projects, arrange installation, and ensure quality control
Bundled Incentives and Services ▪ Combinations of financial and non-financial incentives	<i>Example:</i> Offering builders/developers both design incentives and cash rebates for building high-efficiency buildings	<i>Example:</i> Offering retailers cash incentives and providing training for sales staff	<i>Example:</i> Providing design assistance to develop customer projects, arranging financing, and subsidizing interest rates

Incentive designs and levels often vary from program to program, sometimes raising questions among regulators or other stakeholders. To understand the reasons why incentives may differ between programs and markets, and may change over time, it is helpful to view programs within the context of the larger **portfolio of energy efficiency** programs.

Leading program administrators around the country design portfolios to address all customer types, to anticipate system needs, to manage performance risk, and to ensure a pipeline of program savings in both the near and longer term.² As a result, when looking across a portfolio, the type and magnitude of incentives may differ, based on the market barriers and other characteristics of each market. For example, low-income customers lack time and money for implementing efficiency measures, so a direct installation approach may be used and covering the full cost of the measures may be justified. For other residential customers, a mass-market approach may be used and only a portion of the incremental costs for buying and installing similar measures would be covered by utility incentives.

A program portfolio approach also includes a time dimension. Initially, incentive levels may need to be higher to attract the attention of suppliers and customers, but as programs and markets mature, incentive levels for particular technologies may need to be adjusted downward, focused on higher efficiency levels, or eliminated altogether. Similarly, within a portfolio of programs, it is increasingly important to include more complex programs aimed at achieving deeper savings in homes, buildings, and industrial facilities. Initially, these more complex programs may deliver a small portion of a portfolio-wide savings, but over time as program infrastructure is built, they

ramp up to help achieve more aggressive goals or fill in a gap left by programs that have matured and been discontinued.

Keeping in mind both of these dimensions of the larger program portfolio—the market segmentation dimension and the time dimension—can help avoid confusion about the differences among incentive designs or levels.

Program Theory and Design: The Basis for Efficiency Program Incentives

Program designers use program theory to help determine the best mix of incentives and other strategies to deploy in a program. Program theory involves identifying the key market actors involved (e.g., manufacturers, distributors, customers) in delivering the targeted energy-efficient goods or services, the market barriers each of these players faces in trying to sell or procure the good, and the strategies that can be used to best influence them (see Table 2 for illustrative examples). Program theory can also identify helpful metrics to track in order to determine whether program strategies are working as anticipated (e.g., number of participating suppliers, number of rebates fulfilled).

Table 2. Illustrative Program Theory Examples: Key Stakeholders, Barriers, and Program Strategies by Customer Segment

Customer Segment	Key Stakeholders	Key Program Barriers	Key Program Strategies
Large Commercial and Industrial Retrofit	- Contractors - Building owners and operators - Distributors: lighting, HVAC, motors, other - Product manufacturers - Engineers - Energy service companies	- Access to capital - Competing priorities - Lack of information - Short-term payback (under two years) mentality	- Financial incentives (rebates) - Performance contracting - Performance benchmarking - Partnership with ENERGY STAR® - Low-interest financing - Information from unbiased sources - Technical assistance - Operations and maintenance training
Small Commercial	- Distributors: lighting, HVAC, other - Building owners - Business owners - Local independent trades	- Access to capital - Competing priorities - Lack of information	- Financial incentives (rebates) - Information from unbiased sources - Direct installation - Partnership with ENERGY STAR

Customer Segment	Key Stakeholders	Key Program Barriers	Key Program Strategies
Commercial and Industrial New Construction	- Architects - Engineers - Building and energy code officials - Building owners - Potential occupants	- Project/program timing - Competing priorities - Split incentives (for rental property) - Lack of information - Higher initial cost	- Early intervention (ID requests for hookup) - Design assistance - Performance targeting/benchmarking - Partnership with ENERGY STAR - Training of architects and engineers - Visible and ongoing presence in design community - Education on life cycle costs
Residential Existing Homes	- Distributors: appliances, HVAC, lighting - Retailers: appliance, lighting, windows - Contractors: HVAC, insulation, remodeling - Homeowners	- Higher initial cost - Lack of information - Competing priorities - Inexperience or prior negative experience with technology (e.g., early compact fluorescent lighting) - Emergency replacements	- Financial incentives - Partnership with ENERGY STAR - Information on utility Web sites, bill inserts, and at retailers - Coordination with retailers and contractors
Residential New Homes	- Contractors: general and HVAC - Architects - Code officials - Builders - Home buyers - Real estate agents - Financial institutions	- Higher initial cost - Split incentives: builder is not the occupant	- Partnership with ENERGY STAR - Linking efficiency to quality - Working with builders - Building code education and compliance - Energy-efficient mortgages

Customer Segment	Key Stakeholders	Key Program Barriers	Key Program Strategies
Multifamily	▪ Owners and operators ▪ Contractors ▪ Code officials ▪ Tenants	▪ Split incentives ▪ Lack of awareness	▪ Financial incentives ▪ Marketing through owner and operator associations
Low Income	▪ Service providers: WAP, LIHEAP ▪ Social service providers: state and local agencies ▪ NGOs and advocacy groups ▪ Credit counseling organizations ▪ Tenants	▪ Program funding ▪ Program awareness ▪ Bureaucratic challenges	▪ Consistent eligibility requirements with existing programs ▪ Direct installation ▪ Leveraging existing customer channels for promotion and delivery ▪ Fuel-blind approach

Source: National Action Plan for Energy Efficiency (2006).

HVAC = heating, ventilation, and air conditioning;

LIHEAP = Low-Income Home Energy Assistance Program; NGO = nongovernmental organization;

WAP = Weatherization Assistance Program

The program designer's goal is to develop the most effective and cost-effective mix of financial incentives, upstream incentives, and program services to address the barriers in each of the markets the program portfolio serves. Applying the program theory approach to the design process can be summarized (though oversimplified) in the following steps:

1. **Define customer types.** The most common approach in framing target markets is to segment customers by type, then identify the key market cycles in which customers' efficiency investment choices can best be influenced. Customer types are typically divided, at a minimum, between **residential** and **non-residential** customers. Within residential customers, **low income** customers are often identified as a customer group requiring unique approaches. Non-residential customers are then typically segmented into **small commercial** and **large commercial/industrial**. Some portfolios also segment industrial customers out from commercial customers. Depending on building size, efficiency improvements to **multifamily** residents may be targeted via residential or commercial programs. A complete program portfolio would normally seek to provide programs to all of these customer types.
2. **Define market segments.** For each customer type, typical cycles can be identified in which efficiency opportunities are largest and/or easiest to influence. These include **new construction**, especially for residential and commercial buildings; **equipment replacement**, or the market for replacing existing appliances and equipment as they wear out; and **elective retrofit**, which involves replacing or upgrading products, equipment, or appliances without regard to the replacement cycle. Efficient designs can be achieved at much lower capital costs than later retrofits, and some building energy

features cannot realistically be altered via retrofits. New construction and equipment replacement markets are commonly referred to as “**lost opportunity**” markets, because these activities will occur whether or not the program influences them, and if the program does not influence them, efficiency opportunities can be lost, at least until the cycle renews itself. Because buildings typically remain in use for 50 to 100 years or more, and equipment can last 15 to 30 years, the energy impact of lost opportunities can be great, and thus program designers typically work hard to capture large shares of new construction and equipment replacement markets.³ Elective retrofit markets, because they have no pre-existing replacement cycles, require a different approach to incentive and program design. These programs often require higher incentive levels, and may entail more services to facilitate retrofit projects.

3. **Identify key market barriers.** The market definition process in steps 1 and 2 typically produces a set of broad target markets. The next step is to focus on the key actors involved in these markets and the key barriers that each market participant faces in supplying or procuring more efficient goods and services. Understanding market barriers entails understanding market actors, their key interests, and their decision-making processes. Because the literature on market barriers is extensive, this brief does not seek to recap it.⁴ There is no single set of consensus definitions for market barriers: for the purposes of this brief, we summarize barriers into **structural**, **financial**, and **informational** types.
 - **Structural barriers** occur when certain parties in a market are not motivated or enabled to support energy efficiency policy goals, notably the “split-incentive” or “principal-agent” barrier. An example of this is when the tenant pays the energy bills and the landlord has little incentive to upgrade to efficient options.
 - **Financial barriers** occur when the incremental cost of the efficient technology or practice is significantly higher than a standard efficiency counterpart. For example, if an efficient air conditioner costs \$500 more than a standard unit, most customers will choose the less expensive model.
 - **Informational barriers** occur when customers or other market participants lack the information, expertise, or time to determine the most energy-efficient choices in a given market.

In residential markets, program designs like Home Performance with ENERGY STAR pursue bundles of measures saving up to 40 percent of heating and cooling costs, and costing \$5,000 to \$10,000 or more (for a typical single-family home, savings could exceed \$300 per year). In commercial markets, one finds comprehensive approaches including performance benchmarking,⁵ retro-commissioning,⁶ and customized retrofits, used as part of a range of financial incentives, technical services, and bundled services/incentives.

4. **Design the incentives.** Well-designed incentives address the key market barriers in the target market. Financial incentives are designed to be just high enough to gain the desired level of program participation. In some cases, financial incentives can be bundled with financing, information, or technical services to reach program participation and energy savings goals at lower total program cost than using financial incentives alone. For example, a new home construction program could be designed to offer homebuyers cash incentives for buying high-efficiency homes. However, this incentive

design may not address the key market barrier, which is homebuilders' limited motivation to design and build such homes, and could thus lead to very low participation levels. The most successful programs focus more resources on builders than buyers; and many have found that giving builders the technical assistance needed to design and build high-efficiency homes can be at least as effective as cash incentives.

For more straightforward equipment rebates where the incentive design process mainly involves determining how much of the cost of a product to offer the customer, the process can be fairly simple, as illustrated in the following example steps:

- Product A, a high-efficiency model, costs \$500.
- Product B, a standard model, costs \$400.
- The incremental cost of Product A is \$100. This amount has been determined to be cost-effective.
- Market research has determined that reducing the incremental cost of Product A to \$50 will induce most customers in that market to purchase the product
- The program designer sets the incentive level at \$50.

This incentive design process should not be an abstract analytical effort. Engaging customers and trade allies in program design will provide a lot of the basic information on market barriers, incentive types and levels, and other services that may be needed to make the program work. Incentives designed using input from customers and trade allies are far more likely to be effective than those designed in abstract, and continuing regular feedback and market observation allows program designers and operators to update the programs as market conditions and program success change over time. Feedback should be part of sound program management as an internal process; it may also take the shape of third-party evaluation of processes. For internal purposes, feedback can be reviewed monthly, quarterly, or annually; more formal process evaluations typically occur at least one year after program launch.

Incentive Design Options

This section provides examples of how different types of incentives are applied, the extent to which they support key impacts that efficiency programs seek to achieve, and some of their principal advantages and disadvantages:

- **Direct incentives.** These provide direct payments, tax incentives, or other subsidies to consumers for purchasing and implementing specified efficient products and practices. Cash payments typically take the form of rebate checks returned to customers following approval of a submitted rebate application. Utility bill credits show up as deductions from subsequent customer utility bills. Subsidized financing might include reduced interest rates, extended loan terms, or relaxed underwriting criteria. Advantages of financial incentives can include simplicity, ease of administration, and direct economic benefit to participating customers (although care must be taken to make them user-friendly to customers). Disadvantages include potentially high cost to program sponsors if market conditions require high incentive levels, the potential for failing to address key market barriers, limited ability to transform markets in the longer term (i.e., markets may stop buying efficient products when direct incentives stop), or the opposite—the market

transforming more quickly than anticipated, leading to high free-ridership (the program paying incentives for things that would have happened on their own).

- **Upstream/midstream incentives.** These provide incentives not to customers, but to partners in the market supply chain: “upstream” incentives reach relatively far up the supply chain, typically to manufacturers; “midstream” incentives are targeted closer to the customer end of the market, typically at retailers or installation contractors. For example, upstream incentives can involve payments to manufacturers for making efficient products, or paying building designers to incorporate high-efficiency designs. Midstream incentives can include payments to retailers for stocking, promoting, or selling specified efficient products, or payments to contractors for installing heating and cooling equipment using specified quality procedures. Upstream and midstream incentives offer the advantage that incentive amounts can sometimes be lower, as market partners may need less “convincing” to make or sell efficient technologies. They can also help condition markets for longer-term changes in product specifications, stocking patterns, and so on. Upstream incentives alone, however, may not educate or engage customers enough to change wider customer perceptions, purchasing patterns, or behavior.
- **Information services.** Informational services that encourage customer energy efficiency investment and energy-saving behavior change can include home or facility energy assessments, technology-specific information materials, and product labeling and branding programs like ENERGY STAR. Providing enhanced utility billing data and related information can also support customer awareness and action. Training can range from teaching contractors to sell the benefits of efficient products to engaging architecture/engineering firms to evaluate and recommend efficient building designs. Advantages of information services include low cost, broad market reach, and addressing fundamental barriers. Disadvantages include limitations in addressing other key barriers, limitations in affecting specific market participants and transactions, and lack of long-term impacts without continued funding.
- **Technical services.** Technical services go beyond information services: they provide analysis and professional support for specific projects, while information services tend to address broad markets and customer types. In some markets, professional help in developing projects to the point of installation, and even in providing construction management services, is extremely valuable. This is especially true in corporate and institutional markets, where capital and financing are available and an economically attractive investment is likely to be implemented. Technical service incentive approaches have the advantage of relatively low cost compared to the total investment, as well as being targeted to specific markets and customers. If coupled with broader training and market development efforts, they can also transform wider markets by changing professional practices. Disadvantages include potentially limited total market impact, the limited availability of specialized expertise for such efforts, and the limited market and project types for which this approach is applicable.
- **Bundled incentives and services.** Mixing a set of monetary incentives with other services to achieve both greater program impact and more lasting market transformation effects is a strong trend in today’s leading energy efficiency programs. As program sponsors gain experience through customer and trade ally interaction and through program evaluations, they often find that monetary incentives shrink as a fraction of total program costs, while other services evolve to extend program impacts. See the text box below for examples of such multi-faceted programs. The principal advantage of the

bundled approach is its effectiveness in reaching specific markets; it can also improve total program impact and program cost-effectiveness. Disadvantages include complexity, potential high costs, and limited transferability to other markets (for example, a complex technical assistance service aimed at larger commercial/industrial customers might not be applicable or cost-effective for small commercial customer markets).

Table 3 summarizes the effectiveness of the five main incentive types in attaining key impacts. The high/medium/low estimates in each cell are indicative only; much depends on the details and the context in which the incentive is applied in a specific market and program design. These judgments are necessarily subjective, but because they are based on program experience across the United States they provide reasonable guidance for program designers and policy-makers.

Table 3. Comparative Impacts of Incentive Types

Key Impacts	Direct Financial Incentives	Upstream/Midstream Incentives	Information Services	Technical Services	Bundled Incentives/Services
Impact on Capital Investment	H	M	L	M	H
Impact on Behavior Change	L	L	H	M	M
Impact on Customer Decisions	H	M	M	M	H
Impact on Third Party Decisions	L	H	M	L	M
Impact on Participation	H	H	L	M	H
Impact on Energy Savings	M	L	L	M	H
Impact on Measurement and Verification Complexity/Cost	L	M	H	M	M
Impact on Regulatory Approval	L	M	L	M	M

H = highly likely to be effective for the incentive and its role;

M = moderately likely to be effective; L = low likelihood of being effective

Elaborating on Table 3, incentives' impacts may vary in the following areas:

- **Capital investment.** Getting customers to invest in efficiency projects typically takes either direct incentives or a bundle of incentives and services. Information alone does not tend to have a strong impact, but upstream incentives or technical services can have a moderate impact in some markets.
- **Behavior/practice change.** Encouraging customers to change the way they use appliances or operate buildings is best impacted by information services. Financial incentives may not be as effective and may be unnecessarily costly for this purpose. Technical assistance and bundled offerings can be effective.

-
- **Customer decisions vs. third-party decisions.** Customers tend to respond best to direct financial incentives, though upstream/midstream incentives and information and technical services can have moderate impacts. Third parties in the supply chain are best impacted by upstream incentives.
 - **Participation.** Getting customers to sign up for programs is typically achieved most effectively by some form of financial incentive, with lesser impacts from information or technical assistance alone.
 - **Magnitude of energy savings.** The best way to realize high energy savings per customer is to use bundled offerings with high financial incentives and significant technical services, though direct incentives or technical services can have a moderate impact, depending on the market.
 - **Measurement and verification complexity/cost.** Information programs tend to be lower-cost than financial incentive programs, but they present challenges that may raise the cost of monitoring, verification, and other evaluation needs. Many direct rebates can be relatively simple for these purposes.

Emerging Incentive/Service Approaches for Whole-Building, Deep Savings

The National Action Plan for Energy Efficiency Vision for 2025, in seeking to implement all cost-effective energy efficiency, encompasses an approach that not only mines efficiency in all major markets, but also seeks deeper levels of savings per customer. The early years of an efficiency program effort are designed to secure the most cost-effective and rapidly attainable efficiency savings, often through direct incentives offered on a mass market basis. This approach can generate substantial impacts and can reach several markets, but it tends to realize limited savings on a per-customer basis.

For example, in residential markets, early program designs may target lighting and appliances, as many of these measures are very cost-effective, can be deployed broadly across mass markets, and can drive large total energy impacts. But the majority of the cost-effective potential in the residential sector may lie in more expensive, comprehensive program approaches that target heating, cooling, and hot water end uses and thermal envelope improvements. Likewise, in nonresidential markets, lighting retrofits can be very cost-effective and achieve large savings, but do not directly tap the savings to be found in heating, ventilation, and air conditioning (HVAC) systems.

Experienced program sponsors today are deploying these more-comprehensive program models, often while keeping up many of their proven, successful mass market and targeted incentive programs. Comprehensive programs in a well-designed portfolio can complement rather than supplant simpler and mass market approaches. Examples of innovative program models in this category include:

- **Home Performance With ENERGY STAR:**
<http://www.energystar.gov/homeperformance>
- **Xcel Energy Commercial Real Estate Efficiency program:**
http://www.xcelenergy.com/Minnesota/Business/Programs_Resources/ConservationRebates_Incentives_Business/Pages/Commercial_Real_Estate.aspx
- **New Jersey Clean Energy Pay for Performance:**
<http://www.njcleanenergy.com/commercial-industrial/programs/pay-performance>
- **Energy Trust of Oregon:**
<http://energytrust.org/business/incentives/commercial-buildings/new-building/custom/custom-track-incentives>
- **Building Performance With ENERGY STAR (an NSTAR performance-based incentive pilot program):**
http://www.nstaronline.com/business/energy_efficiency/electric_programs/benchmark.asp

Emerging Data Center Energy Efficiency Programs

Within both new construction and retrofit program portfolios, program administrators are exploring new program designs to incent greater energy efficiency in data centers. Examples of emerging data center energy efficiency programs include:

- **Pacific Gas and Electric:**
http://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/incentivesbyindustry/hightech/data_center_baseline2009-10-01.pdf
- **Energy Trust of Oregon/New Data Center incentive:**
<http://energytrust.org/TA/insider/0908/ExistingBuildings.html>
- **Xcel/Colorado:**
http://www.xcelenergy.com/Colorado/Business/Programs_Resources/ConservationRebates_Incentives_Business/Pages/DataCenterEfficiency.aspx
- **Austin Energy:**
<http://www.austinenergy.com/Energy%20Efficiency/Programs/Rebates/Commercial/Commercial%20Energy/dataCenter.htm>

Program Experience: Summary of Incentives Offered in Best-Practice Programs

This section summarizes a mix of quantitative and qualitative experience with incentives as they are offered through energy efficiency programs in the field. Table 4 is built on the same basic structure as those above; however, it does not report information on financing or information services, as available data were either insufficient or unsuitable for this summary format.

Table 4. Summary of Incentives Offered in Current Programs

Customer Types/Markets	Incentive Types			
	Direct Incentives	Indirect Incentives	Technical Services	Bundled Incentives/Services
Residential				
New construction	Direct incentives to consumers are rare ^a	Builder incentives typically range from \$400 to \$2,000/home Incentives for ENERGY STAR Advanced Lighting Package range from \$100 to \$525/home	Technical services for builders and contractors include: - Design assistance - Contractor training - Sales training - Free/shared-cost energy rating services	Programs may also offer: - Builder financing - Cooperative marketing and advertising - Bonuses for installing high-efficiency appliances, lighting, or HVAC equipment^b
Lighting/low-cost retrofit	Typical ranges: - Fixtures: \$10–\$20^c - CFLs: \$0–\$25^d - Ceiling fans: \$15–\$20^e	Manufacturer and/or retailer buy-downs on specified products; some sponsors use a request for proposals process^f	Technical support can include: - Education and outreach efforts^g - Developing standards of practice for participating contractors^h - Enhancing displays and increasing qualified product inventory	Programs may also offer direct install programs focused on no- and low-cost upgrades, such as: - CFLs - Low-flow shower heads - Faucet aerators - Programmable thermostats - Cooperative marketing and advertising, special promotions and events

Customer Types/Markets	Incentive Types			
	Direct Incentives	Indirect Incentives	Technical Services	Bundled Incentives/Services
Higher-cost retrofit	Typical ranges: - Building envelope (windows, insulation): \$1–\$10 (per square foot)ⁱ - Equipment system upgrades, e.g., \$300 rebate for duct sealing^j - Project subsidy, e.g., 70% of comprehensive HVAC/envelope project cost^k	Remodeler incentives for installing the ENERGY STAR Advanced Lighting Package for major renovation: \$100 to \$525/home	Technical services can include: - Contractor/trade ally education/outreach^l - Developing standards for participating contractors^m - Diagnostic energy audit - Conducting field visits and trainingⁿ	Programs may also offer: - Low-interest financing - Point of sale financing^o
Equipment replacement	Typical ranges: - Clothes washers: \$50–\$75 - Dishwashers: \$25–\$50 - Refrigerators: \$25–\$50 - Room air conditioning: \$25–\$35 - HVAC equipment: \$100–\$1,200^p		Technical support can include: - Contractor training on quality installation, sizing, etc. - Developing standards for participating contractors^q - Field visits and training^r	

Customer Types/Markets	Incentive Types			
	Direct Incentives	Indirect Incentives	Technical Services	Bundled Incentives/Services
Small Commercial				
New construction	<i>Small commercial new construction programs are rare</i>			
Lighting/low-cost retrofit	Typical ranges: <i>Fluorescent fixtures</i> ▪ \$1–\$200 per fixture ▪ 30%–50% of project cost <i>Sensors</i> ▪ \$10–\$75, depending on sensor type <i>LED linear fixtures</i> ▪ \$2–\$6 <i>Exit signs</i> ▪ \$10–\$75 (typically for LED signs)^s	Program sponsors may offer: ▪ Additional incentives to lighting contractors ▪ Manufacturer buy-downs through a request for proposals process^t	Technical services can include: ▪ Energy audits ▪ Training for trade allies^u ▪ Providing a list of qualified or participating contractors^v ▪ Developing a trade ally network through a competitive bid process^w	Programs may also offer: ▪ Direct installation services ▪ Marketing support ▪ Low-cost financing to cover costs beyond direct incentives^x ▪ Electronic data services to help customers obtain energy-efficient products^y
Higher-cost retrofit	Direct incentives include: ▪ Covering a percentage of installed project costs (e.g., 50% of installed costs)^z		Technical support can include: ▪ Site energy assessments at low or no cost^{aa} ▪ Trade ally training and technical support ▪ Developing qualified trade ally networks^{bb}	Programs may also offer: ▪ Project development services ▪ Low-cost financing for project costs beyond direct incentive payments^{cc}

Customer Types/Markets	Incentive Types			
	Direct Incentives	Indirect Incentives	Technical Services	Bundled Incentives/Services
Equipment replacement	Typical ranges: - Commercial food service equipment: \$200–\$600 - Project incentives (percentage of project costs)		Technical services can include: - Recruiting and training trade allies - Developing qualified trade ally lists and networks	Programs may also offer: - Low-cost financing for project costs - Direct incentive payments
Large Commercial/Industrial				
New construction	Direct incentives vary from prescriptive rebates per measure, similar to those offered for retrofit or replacement, to performance-based incentives based on energy/demand reductions^{dd}	Some programs offer incentives to the design team to encourage comprehensive, whole building upgrades starting early in the design process^{ee}	Technical support can include: - Design assistance for specific projects - Helping customers and designers set performance targets, using tools such as ENERGY STAR Target Finder (\$2,000–\$30,000 per project)^{ff}	Over time, some programs evolve to a comprehensive set of education, design assistance, market transformation, and direct incentives^{ff}
Lighting/low-cost retrofit	Typical ranges: <i>Lighting systems</i> 30%–75% of project cost \$0.03–\$0.75/kilowatt-hour saved^{gg} <i>Sensors</i> \$10–\$75, depending on sensor type	<i>See Small Commercial Section</i>	<i>See Small Commercial Section</i>	<i>See Small Commercial Section</i>

Customer Types/Markets	Incentive Types			
	Direct Incentives	Indirect Incentives	Technical Services	Bundled Incentives/Services
Higher-cost retrofit	Typical offerings: 50%–100% of incremental costs^{hh} \$0.05–\$0.29/kilowatt-hour; \$0.45/therm savedⁱⁱ \$275–\$530 per annual kilowatt saved^{jj,kk} - Payments yield targeted simple payback, typically capped at a percentage of incremental cost^{ll} - Commissioning/retro-commissioning incentives^{mm} - Performance contractingⁿⁿ		Technical support can include: - Trade ally and customer staff training and technical support - Free/shared cost for technical services^{oo,pp}	Programs may also offer: - Financing^{qq} - Onsite energy engineers for extended periods
Equipment replacement	Direct incentives can be prescriptive as outlined above, but for larger customers they tend to be more customized, as equipment is used in more complex and specific applications. Such incentives tend to pay a portion of the incremental cost for efficient equipment or systems^{rr}	Upstream incentives targeted to equipment suppliers may overcome market barriers more easily than consumer-oriented incentives^{ss}	Technical services can include: Training efforts to expose consumers and suppliers to the benefits of energy-efficient equipment or practices^{tt}	

See table notes on next page.

Table notes

- ^a Purchasers of ENERGY STAR–qualified homes receive a lower electricity rate (approximately 5 percent lower) from Jackson Electric Membership Corporation (see <http://www.jacksonemc.com>).
- ^b Source: Alliant Energy (2009), MidAmerican Energy (2009).
- ^c Source: DOE and EPA (2010).
- ^d Source: DOE and EPA (2010).
- ^e Source: DOE and EPA (2010).
- ^f Source: York et al. (2008).
- ^g California investor-owned utilities and Efficiency Vermont. Source: National Action Plan for Energy Efficiency (2006), Chapter 6.
- ^h California. Source: Quantum Consulting (2004e), p. 35.
- ⁱ Source: DOE and EPA (2010).
- ^j Sacramento Municipal Utility District (California). Source: Quantum Consulting (2004e), p. 33, Exhibit R4-6.
- ^k Tacoma Residential Weatherization Program (California). Source: Quantum Consulting (2004e), p. 33, Exhibit R4-6.
- ^l California investor-owned utilities and Efficiency Vermont. Source: National Action Plan for Energy Efficiency (2006), Chapter 6.
- ^m California. Source: Quantum Consulting (2004e), p. 35.
- ⁿ Source: York et al. (2008).
- ^o California. Source: Quantum Consulting (2004e), p. 29, Exhibit R4-5.
- ^p Source: DOE and EPA (2010).
- ^q California. Source: Quantum Consulting (2004e), p. 35.
- ^r Source: York et al. (2008).
- ^s Source: North Carolina Solar Center (2009).
- ^t Source: York et al. (2008).
- ^u Source: Quantum Consulting (2004d).
- ^v Seattle City Light. Source: National Action Plan for Energy Efficiency (2006), Chapter 6.
- ^w National Grid (Massachusetts and Rhode Island). Source: York et al. (2008).
- ^x Small Business Energy Advantage (Connecticut). Source: York et al. (2008).
- ^y Source: Quantum Consulting (2004a).
- ^z Small Business Energy Advantage (Connecticut). Source: York et al. (2008).
- ^{aa} Small Business Energy Advantage (Connecticut). Source: York et al. (2008).
- ^{bb} National Grid (Massachusetts and Rhode Island). Source: York et al. (2008).
- ^{cc} Small Business Energy Advantage (Connecticut). Source: York et al. (2008).
- ^{dd} Source: DOE and EPA (2010).
- ^{ee} National Grid (Massachusetts and Rhode Island) and California statewide energy efficiency program. Source: York et al. (2008).
- ^{ff} National Grid (Massachusetts and Rhode Island). Source: York et al. (2008).

-
- ^{gg} National Grid (Massachusetts and Rhode Island). Source: York et al. (2008).
- ^{hh} For example, ComEd: <http://www.comed.com>.
- ⁱⁱ For example, ComEd: <http://www.comed.com>.
- ^{jj} Energy Trust of Oregon: <http://energytrust.org>.
- ^{kk} Source: National Action Plan for Energy Efficiency (2006), Chapter 6.
- ^{ll} Source: North Carolina Solar Center (2009).
- ^{mm} California. Source: Quantum Consulting (2004c), pp. 46–47, Exhibit NR5-6.
- ⁿⁿ California Standard Performance Contracts and NYSERDA Commercial and Industrial Performance Program from California. Source: Quantum Consulting (2004c), pp. 46–47, Exhibit NR5-6.
- ^{oo} Xcel (Colorado) and Sacramento Municipal Utility District (California). Source: Quantum Consulting (2004c), pp. 46–47, Exhibit NR5-6.
- ^{pp} Rocky Mountain Power (Washington and Nevada). Source: York et al. (2008).
- ^{qq} NGrid and United Illuminating Company from California. Source: Quantum Consulting (2004c), pp. 46–47, Exhibit NR5-6.
- ^{rr} Source: Amann and Mendelsohn (2005).
- ^{ss} NYSERDA. Source: National Action Plan for Energy Efficiency (2006), Chapter 6.
- ^{tt} California. Source: Quantum Consulting (2004c), pp. 46–47, Exhibit NR5-6.
- ^{uu} Rocky Mountain Power (Washington and Nevada). Source: York et al. (2008).
- ^{vv} Wisconsin Power and Light Shared Savings (Wisconsin). Source: Quantum Consulting (2004c), pp. 46–47, Exhibit NR5-6.
- ^{ww} California. Source: Quantum Consulting (2004b), p. 17.
- ^{xx} Pacific Gas and Electric Company. Source: York et al. (2008).
- ^{yy} California. Source: Quantum Consulting (2004b), p. 17.

Considerations in Reviewing, Designing, and Implementing Program Incentives

Incentive designs and levels in specific programs and portfolios can vary based on a range of local considerations. These include:

- **Climate.** Some measures may not be appropriate in some climate zones, and incentives for such measures may not be justified. For example, in the warmest Sun Belt climates, incentives for high-efficiency heating systems may be inappropriate while efficient cooling systems may be very cost-effective. The appropriate level of an incentive, however, does not necessarily vary in the same way. If a cooling measure is very cost-effective in a hot climate, customers and trade allies may need relatively small incentives, whereas in milder climates, higher incentives may be needed to produce comparable paybacks.
- **Customer mix.** The types and sizes of customer facilities, and their ownership patterns, can affect the balance of incentive offerings in a portfolio. For example, residential low-income customers have unique needs and may be offered efficiency services from other funding sources. As another example, a higher fraction of customers may occupy rental property in highly urbanized areas. This can call for a greater emphasis on incentives and program designs aimed at building owners distinct from tenant/occupants. If commercial customers are predominantly small businesses, a simple direct installation approach may work better than a complex comprehensive incentive system. In practice, most areas contain enough of the typical customer types to justify a robust range of program incentives across the portfolio.
- **Building stock.** Age, construction type, and other characteristics of the building stock may influence incentive and program focus. Where the housing stock is older, there may be a greater need for comprehensive incentives that seek to bundle envelope improvements with HVAC and other measures. Where housing stock is newer, there may be more focus on prescriptive incentives for appliances and other “plug-load” measures.
- **Industrial base.** If there are a few large, corporate industrial customers in the service area, program incentives may be quite customized, even customer-driven, as customers may be technically sophisticated. Where industrial customers are more small business-based, a more basic set of incentives and technical services may be appropriate.
- **Existing programs.** Many states and localities have existing energy efficiency programs to draw upon, and so any new efforts should be designed to complement such efforts. Federal incentives may also be available. For example, the Energy Policy Act of 2005 created a range of home and business tax incentives, some of which were expanded in the American Recovery and Reinvestment Act (ARRA) of 2009 (http://www.energystar.gov/index.cfm?c=tax_credits.tx_index). Program designs and portfolios should seek to leverage these resources as available. For example, the ARRA substantially increased residential tax credits for envelope, HVAC, and hot water measures through 2010. These can be used as leverage by tuning program incentives and services to make best use of these resources to drive participation. Because tax incentives are typically quite time-limited, they can help accelerate participation during their eligibility period.⁷

Program incentives are also subject to forces in the regulatory environment. Some states have climate policies that make energy efficiency a centerpiece, driving both mandates and funding for energy efficiency. Many states have policies in place to set energy savings targets for utility-sector efficiency programs (energy efficiency resource standards), to provide public funding for efficiency program (public benefits funds), or to require utilities to include efficiency as a resource in integrated resource plans. When resource targets are set, and certain savings levels must be achieved, the need to attain those goals can drive incentive levels and program portfolio decisions. Setting incentive levels somewhat higher, within the range set by cost-effectiveness tests, can drive participation and program savings higher in a given time period. Other program features, such as technical services, training trade allies, and offering upstream incentives, can exert market transformation effects over time, but may not show as significant an impact in the near term.

Key Questions to Ask Regarding Customer Incentives in Program Design

When reviewing program plans, the following questions can help illuminate the key issues that can make a difference between successful and unsuccessful offerings:

- Are the incentives and other program strategies based on a clear, logical program theory that identifies barriers in the target market and designs incentives and other strategies to reduce those barriers?
- Is the program theory based on, and validated by, a detailed market assessment that examines key market actors and decision-making processes?
- Is the program part of a wider portfolio of energy efficiency programs, and if so does it provide appropriate incentives within the portfolio's context? Are incentive levels and other services appropriate for the developmental cycle of the program and the wider portfolio?
- Does the program design consider and seek to leverage other incentive options, such as federal, state, or local tax incentives, or other programs or services?
- Are incentives and other program strategies proven to be effective elsewhere? Has the program designer provided solid evidence of its success in other markets?
- Are incentive and other program strategies appropriate to the climate, customer mix, and local market characteristics?
- Did program designers consult customers and trade allies in designing incentives and other program features?
- Are customer incentives part of a complete program plan, including infrastructure development, marketing, and program implementation and evaluation?
- What may be the unintended consequences of providing the incentives? Can program strategies be designed to reduce any potential negative consequences?
- Is the proposed program or portfolio cost-effective applying the jurisdiction's applicable cost-effectiveness tests?

Notes

- ¹ For information on the full suite of policy and programmatic options to remove barriers to energy efficiency, see the Vision for 2025 and other Action Plan resources available at www.epa.gov/eeactionplan.
- ² Program portfolios offer a suite of services that in combination reach all of the customer classes with efficiency services; in total, they provide cost-effective energy efficiency to the utility and society. See National Action Plan for Energy Efficiency (2006), Chapter 6.
- ³ Energy Trust of Oregon developed a Lost Opportunity Policy to address to what extent program designers and staff should emphasize avoiding lost opportunities in their efficiency programs. This policy is available at <http://energytrust.org/library/policies/4.04.000-P.pdf>
- ⁴ The term “structural barriers” used here is taken from McKinsey & Company (2009). It is a subset of the broader term “market barriers” used in the National Action Plan report (National Action Plan for Energy Efficiency, 2006). Structural barriers, particularly the principal-agent problem, are explored in more depth in International Energy Agency (2007). The term “split-incentive” is an application of the more general “principal-agent” term from economic theory. Classical economics defines the principal-agent problem as a situation in which one party acts as the “agent” on behalf of another party, the “principal,” in a decision process. A typical example is home builders’ role in specifying energy efficiency features of new homes, acting as “agents” on behalf of “principal” home buyers.

The term “financial barriers” used here is included within the broader terms “availability barriers” (used in the McKinsey report) and “customer barriers” (used in the National Action Plan report).

The term “informational barriers” used here corresponds to both “structural” and “behavioral” barriers as those terms are used in the McKinsey report, and to “market” and “customer” barriers in the National Action Plan report.
- ⁵ Performance benchmarking involves compiling a building’s past energy use data, then comparing those data to benchmark values established through statistical analysis of comparable buildings or other metrics.
- ⁶ Retro-commissioning involves assessing a building’s operating conditions, then making operational changes and equipment adjustments to improve operating performance.
- ⁷ Leveraging federal or other outside funding sources can create attribution issues; for example, if two entities (e.g., a utility and a state energy office) each contribute funds to a single program, an attribution method may be needed for each entity to appropriately claim and report program impacts and costs.

Appendix A: National Action Plan for Energy Efficiency Leadership Group

Co-Chairs

Marsha Smith
Commissioner, Idaho Public
Utilities Commission
Past President, National
Association of Regulatory Utility
Commissioners

James E. Rogers
Chairman, President, and
C.E.O.
Duke Energy

Kateri Callahan
President
Alliance to Save Energy

Jorge Carrasco
Superintendent
Seattle City Light

Lonnie Carter
President and C.E.O.
Santee Cooper

Sheryl Carter
Co-Director, Energy Program
Natural Resources Defense
Council

Philip Giudice
Commissioner
Massachusetts Department of
Energy Resources

Dian Grueneich
Commissioner
California Public Utilities
Commission

Blair Hamilton
Policy Director
Vermont Energy Investment
Corporation

Leadership Group

Barry Abramson
Senior Vice President
Servidyne Systems, LLC

Tracy Babbidge
Director, Air Planning
Connecticut Department of
Environmental Protection

Angela Beehler
Senior Director, Energy
Regulation/Legislation
Wal-Mart Stores, Inc.

Bruce Braine
Vice President, Strategic Policy
Analysis
American Electric Power

Jeff Burks
Director of Environmental
Sustainability
PNM Resources

Sandra Byrd
Vice President, Strategic Affairs
Arkansas Electric Cooperative
Corporation

Gary Connett
Director of Environmental
Stewardship and Member
Services
Great River Energy

Larry Downes
Chairman and C.E.O.
New Jersey Natural Gas (New
Jersey Resources Corporation)

Roger Duncan
General Manager
Austin Energy

Neal Elliott
Associate Director for Research
American Council for an
Energy-Efficient Economy

Angelo Esposito
Senior Vice President, Energy
Services and Technology
New York Power Authority

Jeanne Fox
President
New Jersey Board of Public
Utilities

Stephen Harper
Global Director, Environment
and Energy Policy
Intel Corporation

Maureen Harris
Commissioner
New York State Public Service
Commission

Mary Healey
Consumer Counsel for the State
of Connecticut
Connecticut Consumer Counsel

Joe Hoagland
Vice President, Energy
Efficiency and Demand
Response
Tennessee Valley Authority

Val Jensen
Vice President, Marketing and
Environmental Programs
ComEd (Exelon Corporation)

Mary Kenkel
Consultant, Alliance One
Duke Energy

Ruth Kiselewich
Director, Demand Side
Management Programs
Baltimore Gas and Electric
Company

Harris McDowell
Senator
Delaware General Assembly

Ed Melendreras
Vice President, Sales and
Marketing
Entergy Corporation

Janine Migden-Ostrander
Consumers' Counsel
Office of the Ohio Consumers'
Counsel

Michael Moehn
Vice President, Corporate
Planning
Ameren

Fred Moore
Director, Manufacturing and
Technology, Energy
The Dow Chemical Company

Richard Morgan
Commissioner
District of Columbia Public
Service Commission

Diane Munns
Vice President, Regulatory
Relations and Energy Efficiency
MidAmerican Energy Company

Clay Nesler
Vice President, Global Energy
and Sustainability
Johnson Controls, Inc.

Brock Nicholson
Deputy Director, Division of Air
Quality
North Carolina Department of
Environment and Natural
Resources

Jed Nosal
Chief, Office of Ratepayer
Advocacy
Massachusetts Office of
Attorney General Martha
Coakley

Pat Oshie
Commissioner
Washington Utilities and
Transportation Commission

Jim Parks
Manager, Energy Efficiency and
Customer R&D
Sacramento Municipal Utility
District

John Perkins
Consumer Advocate
Iowa Office of Consumer
Advocate

Doug Pettitt
Vice President, Marketing and
Conservation
Vectren Corporation

Phyllis Reha
Commissioner
Minnesota Public Utilities
Commission

Roland Risser
Director, Customer Energy
Efficiency
Pacific Gas and Electric

Gene Rodrigues
Director, Energy Efficiency
Southern California Edison

Wayne Rosa
Energy and Maintenance
Manager
Food Lion, LLC

Art Rosenfeld
Commissioner
California Energy Commission

Ted Schultz
Vice President, Energy
Efficiency
Duke Energy

Larry Shirley
Director of the Green Economy
North Carolina Department of
Commerce

Paul Sotkiewicz
Senior Economist, Market
Services Division
PJM Interconnection

Jim Spiers
Senior Manager, Planning,
Rates, and Member Services
Tri-State Generation and
Transmission Association, Inc.

Susan Story
President and C.E.O.
Gulf Power Company (Southern
Company)

Tim Stout
Vice President, Energy
Efficiency
National Grid

Debra Sundin
Director, Energy Efficiency
Marketing
Xcel Energy

Paul Suskie
Chairman
Arkansas Public Service
Commission

Dub Taylor
Director
Texas State Energy
Conservation Office

David Van Holde
Energy Manager, Department of
Natural Resources and Parks
King County, Washington

Brenna Walraven
Managing Director, National
Property Management
USAA Realty Company

J. Mack Wathen
Vice President, Regulatory
Affairs
Pepco Holdings, Inc.

Mike Weedall
Vice President, Energy
Efficiency
Bonneville Power Administration

Michael Wehling
Strategic Planning and
Research
Puget Sound Energy

Henry Yoshimura
Manager, Demand Response
ISO New England, Inc.

Dan Zaweski
Assistant Vice President,
Energy Efficiency and
Distributed Generation
Long Island Power Authority

Observers

Glen Andersen
Program Principal
National Conference of State
Legislatures

Rex Boynton
President
North American Technician
Excellence

James W. (Jay) Brew
Counsel
Steel Manufacturers Association

Susan Coakley
Executive Director
Northeast Energy Efficiency
Partnerships

Roger Cooper
Executive Vice President, Policy
and Planning
American Gas Association

Mark Crisson
President and C.E.O.
American Public Power
Association

Dan Delurey
Executive Director
Demand Response
Coordinating Committee

Reid Detchon
Executive Director
Energy Future Coalition

Ron Edelstein
Director, Regulatory and
Government Relations
Gas Technology Institute

Claire Fulenwider
Executive Director
Northwest Energy Efficiency
Alliance

Sue Gander
Director, Environment, Energy,
and Natural Resources Division
National Governors
Association—Center for Best
Practices

Jeff Genzer
General Counsel
National Association of State
Energy Officials

Donald Gilligan
President
National Association of Energy
Service Companies

Chuck Gray
Executive Director
National Association of
Regulatory Utility
Commissioners

Katherine Hamilton
President
GridWise Alliance

William Hederman
Member, IEEE-USA Energy
Policy Committee
Institute of Electrical and
Electronics Engineers

Marc Hoffman
Executive Director
Consortium for Energy
Efficiency

John Holt
Senior Manager, Generation
and Fuel
National Rural Electric
Cooperative Association

Eric Hsieh
Manager, Government
Relations
National Electrical
Manufacturers Association

Lisa Jacobson
Executive Director
Business Council for
Sustainable Energy

Wendy Jaehn
Executive Director
Midwest Energy Efficiency
Alliance

Meg Matt
President and C.E.O.
Association of Energy Services
Professionals

Joseph Mattingly
Vice President, Secretary and
General Counsel
Gas Appliance Manufacturers
Association

Kate Offringa
President and C.E.O.
North American Insulation
Manufacturers Association

Ellen Petrill
Director, Public/Private
Partnerships
Electric Power Research
Institute

Steven Schiller
Board Director
Efficiency Valuation
Organization

Jerry Schwartz
Senior Director, Energy and
Environmental Policy
American Forest and Paper
Association

Andrew Spahn
Executive Director
National Council on Electricity
Policy

Ben Taube
Executive Director
Southeast Energy Efficiency
Alliance

Rick Tempchin
Executive Director,
Retail Energy Services
Edison Electric Institute

Mark Wolfe
Executive Director
Energy Programs Consortium

Lisa Wood
Executive Director
Institute for Electric Efficiency

Facilitators

U.S. Department of Energy

U.S. Environmental Protection
Agency

Appendix B: References

Alliant Energy (2009). Energy Efficiency Cash Rewards: 2009 New Home Construction. <http://www.alliantenergy.com/wcm/groups/wcm_internet/documents/contentpage/017136.pdf>

Amann, J.T., and E. Mendelsohn (2005). *Comprehensive Commercial Retrofit Programs: A Review of Activity and Opportunities*. American Council for an Energy-Efficient Economy. Report no. A052. <<http://www.aceee.org/pubs/a052.htm>>

Brown, M.H., and B. Conover (2009). *Recent Innovations in Financing for Clean Energy*. Southwest Energy Efficiency Project. <http://www.swenergy.org/publications/documents/Recent_Innovations_in_Financing_for_Clean_Energy.pdf>

U.S. Department of Energy [DOE] and U.S. Environmental Protection Agency [EPA] (2010). Database for Incentives and Joint Marketing Exchange. <<http://www.energystar.gov/DIME>>

U.S. Environmental Protection Agency [EPA] (2005). *Clean Energy-Environment Guide to Action*. Appendix B: Energy Efficiency Program Resources <<http://www.epa.gov/cleanenergy/energy-programs/state-and-local/state-best-practices.html>>

U.S. Environmental Protection Agency [EPA] (2009). *Rapid Deployment Energy Efficiency (RDEE) Toolkit: Planning & Implementation Guides*. <http://www.epa.gov/RDEE/documents/rdee_toolkit.pdf>

Fuller, M. (2009). *Enabling Investments in Energy Efficiency: A Study of Energy Efficiency Programs That Reduce First-Cost Barriers in the Residential Sector*. Prepared for California Institute for Energy and Environment and Efficiency Vermont. <<http://uc-ciee.org/energyeff/documents/resfinancing.pdf>>

International Energy Agency (2007). *Mind the Gap: Quantifying Principal-Agent Problems in Energy Efficiency*. <http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1954>

McKinsey & Company (2009). *Unlocking Energy Efficiency in the US Economy*. <http://www.mckinsey.com/client/service/electricpowernaturalgas/downloads/US_energy_efficiency_full_report.pdf>

MidAmerican Energy (2009). 2009 Energy Advantage® New Homes Program. <<http://www.midamericanenergy.com>>

National Action Plan for Energy Efficiency (2006). *National Action Plan for Energy Efficiency*. <<http://www.epa.gov/eeactionplan>>

National Action Plan for Energy Efficiency (2009). *Customer Incentives for Energy Efficiency Through Electric and Natural Gas Rate Design*. Prepared by William Prindle, ICF International, Inc. <http://www.epa.gov/cleanenergy/documents/rate_design.pdf>

North Carolina Solar Center (2009). DSIRE: Database of State Incentives for Renewables and Efficiency. <<http://www.dsireusa.org>>

Quantum Consulting (2004a). *National Energy Efficiency Best Practices Study: Volume NR1—Non-Residential Lighting Best Practices Report*. Submitted to California Best Practices Project Advisory Committee, Pacific Gas and Electric Company.
<http://www.eebestpractices.com/pdf/BP_NR1.pdf>

Quantum Consulting (2004b). *National Energy Efficiency Best Practices Study: Volume NR2—Non-Residential HVAC Best Practices Report*. Submitted to California Best Practices Project Advisory Committee, Pacific Gas and Electric Company.
<http://www.eebestpractices.com/pdf/BP_NR2.pdf>

Quantum Consulting (2004c). *National Energy Efficiency Best Practices Study: Volume NR5—Non-Residential Large Comprehensive Incentive Programs Best Practices Report*. Submitted to California Best Practices Project Advisory Committee, Pacific Gas and Electric Company.
<http://www.eebestpractices.com/pdf/BP_NR5.pdf>

Quantum Consulting (2004d). *National Energy Efficiency Best Practices Study: Volume R1—Residential Lighting Best Practices Report*. Submitted to California Best Practices Project Advisory Committee, Pacific Gas and Electric Company.
<http://www.eebestpractices.com/pdf/BP_R1.pdf>

Quantum Consulting (2004e). *National Energy Efficiency Best Practices Study: Volume R4—Residential Single-Family Comprehensive Weatherization Best Practices Report*. Submitted to California Best Practices Project Advisory Committee, Pacific Gas and Electric Company.
<http://www.eebestpractices.com/pdf/BP_R4.pdf>

York, D., M. Kushler, and P. Witte (2008). *Compendium of Champions: Chronicling Exemplary Energy Efficiency Programs From Across the U.S.* American Council for an Energy-Efficient Economy. Report no. U081. <<http://www.aceee.org/pubs/u081.htm>>

