Transforming Ourselves While Transforming the Market: Turning Technical Expertise into the *Consumer Guide to Home Energy Savings*

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ABSTRACT

This paper presents ACEEE's experience to date with producing consumer education materials on home energy savings. In 2007, the authors undertook a major overhaul of the popular *Consumer Guide to Home Energy Savings* in order to better meet the needs and expectations of an increasingly demanding public and competitive marketplace. Changes to content, format, and graphics in the book were informed by new research, changes in data availability, and policy changes, in addition to two decades of experience tracking efficiency opportunities and responding to public inquiries. A review of the history and success of our consumer resources suggests that effective translation of technical expertise into decision-making tools for consumers requires us to periodically revisit the fundamental approach of how we design these tools. We describe lessons learned about serving consumers by using examples from our recent revision of the *Consumer Guide*, to identify the top research and coordination needs that are necessary to bring our technical expertise into better alignment with the needs of consumers.

Introduction

Effective information diffusion instruments are critical to the success of market transformation efforts. Regardless of the stated objective of a given policy or program, advancing energy-efficient technologies and practices ultimately depends on how well advocates are able to recognize and close the gap between the information consumers seek and the information they need to know in order to make decisions that are positive for them, for the economy and for the environment.

In the residential sector, our consumer outreach efforts encounter a growing market for "green" consumer products and resources. From the periodic "green issues" of virtually every magazine on the newsstand to the marketing strategies of major corporations striving to be the first to "go green," products and services that claim a lighter environmental footprint are enjoying prime visibility among consumers. This market shift presents us with new opportunities to leverage green market demand for energy efficiency. However, increasing public awareness can also be accompanied by increased risk of "greenwashing" and misinformation, particularly among consumers who have the least access to information, but the most to gain from making the right choices. For the energy efficiency community, these risks represent opportunities to properly reevaluate the approaches we use to ensure our communications and diffusion instruments are accurate, current, credible, and result in real energy savings.

ACEEE and Consumer Education: Our Transformational Beginning

ACEEE has long linked our policy advocacy with consumer education, but we didn't start out with that objective. In a foundational document (Berman, et al., 1979), the original organizing committee articulated ACEEE's mission, in part, as proposing policies that "involve only technical fixes that will continue to provide the goods and services people want, while substantially reducing the expenditures on energy and other resources, the damage to the environment, and our dependence on insecure foreign sources." Absent is any mention of educating or serving consumers. Rather, the target audience was, "persons in government, industry, business, and research." Furthermore, "Information based on research, economic feasibility, regulatory possibility, and market experience should be exchanged, understood, refined, and made mutually acceptable to all those who are so necessary to bring about a more energy-efficient society."

One of the earliest and most tenaciously pursued policy priorities was increasing appliance efficiency standards. ACEEE began its decades-long work on standards early in the 1980s. As ACEEE sought to build bridges between energy efficiency experts and policymakers in order to advocate stricter end-use product efficiency standards, the organization realized that consumers were a key element in this equation. Consumers' purchase decisions could reinforce policy decisions; they could wield great power in pushing acceptance of appliance standards and energy-efficient practices in the marketplace. By purchasing energy-efficient products, consumers would not only save money and help protect the environment, but they would also reinforce the policy decisions that mandated greater end-use efficiency. Thus, the organization undertook initial incremental efforts to understand the role of consumers in achieving greater energy efficiency and how to educate them.

ACEEE's launched its first foray into consumer education in the early 1980s as distributor, then co-author, and eventually publisher of booklets that provided tips for consumers about how to improve the efficiency of their home heating equipment and appliances. In 1984, ACEEE published its first *The Most Energy-Efficient Appliances* booklet which listed the "most efficient" appliance models available on the market by appliance product category. This first "*Most*" booklet, and subsequent bi-annual updates, appeared more than a decade before ENERGY STAR® began listing qualified products for most appliance types. They were very successful—consumers bought thousands of the booklets at $3 each. The runaway success of *50 Simple Things You Can Do to Save the Earth* in 1990, which contained a lot of information from ACEEE's booklets led ACEEE to launch our own full-scale book about energy efficiency in the home, the *Consumer Guide to Home Energy Savings*, first published in 1991.

As a downstream reinforcement tool for the efficiency efforts of nearly three decades, ACEEE's *Most Energy-Efficient Appliances* booklets and subsequent editions of the *Consumer Guide to Home Energy Savings* have operated within the organization's traditional paradigm of efficiency improvements: policies that target incremental technological gains within discreet end-use and product categories. Although ACEEE is not primarily a consumer advocacy organization, we found a valuable niche in consumer education by linking policy to the marketplace.

Market Drivers

In the years since ACEEE published its first consumer publications, the landscape for energy efficiency has been altered substantially. Appliance and equipment standards have reduced the energy consumption of many products significantly. ENERGY STAR has become a widely recognized symbol of energy efficiency for consumers in the market for energy-efficient products and services. Efficiency programs have provided information, rebates, and other incentives to consumers to seek out energy efficiency and to manufacturers, retailers, and contractors to offer more efficient products and services to their customers. The combination of market push and market pull has created a cycle of energy efficiency improvements in products that continues to deliver energy savings (along with water savings and other non-energy benefits that are important to consumers). As we achieve the energy savings potential from more basic equipment upgrades, the attention has turned to opportunities for system-wide energy savings in homes.

These developments have driven ACEEE's consumer education efforts in several ways. Our publications must be updated regularly to provide the latest information on appliance standards. With the launch of ENERGY STAR, we began to educate consumers about the label and program requirements for various products. While encouraging users to seek out ENERGY STAR as a first step, in some cases we recommend that consumers purchase products that exceed the ENERGY STAR specifications or consider attributes outside the scope of ENERGY STAR such as refrigerator size and configuration or, until recently, clothes washer water consumption. The growth in market tracking and program evaluation—along with direct feedback in the form of consumer inquiries to ACEEE via phone, letters, and e-mail—have yielded much better information on the market for efficient products and the issues of concern to consumers, helping us to craft more effective messages and provide answers to common questions.

Broader social changes, most notably the emergence of the internet and the rapid growth in rates of computer ownership and web access, have fundamentally altered the types of information readily available to consumers. As other sources—including ENERGY STAR, manufacturers/trade associations, retailers, and efficiency programs—have increased the amount of product specific information available, ACEEE is no longer the only source providing lists of energy–efficient appliances. In response, we have scaled back the compilation of our own lists (a time-intensive process) in favor of more education on consumer decision-making. We continue to look for ways to help consumers navigate and use our own resources and the growing body of information available to them.

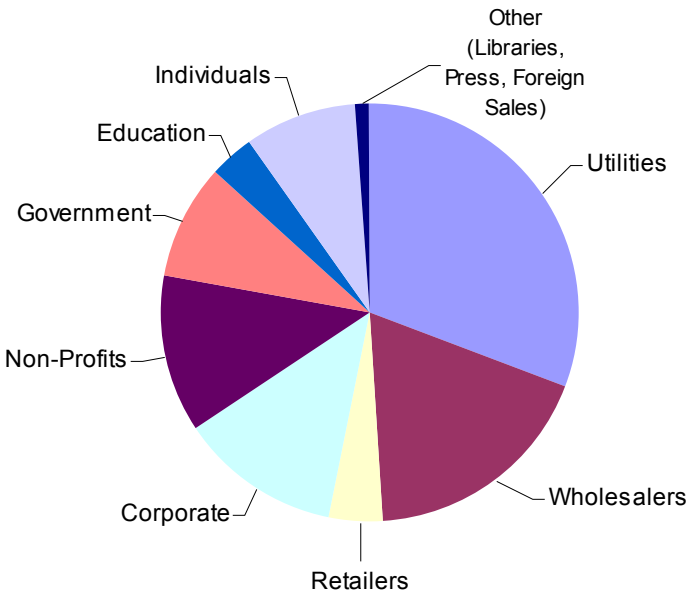
Measuring Impact

Distribution in Print and on the Web

Since its inception, sales of the *Consumer Guide to Home Energy Savings* total nearly 300,000 copies. Figure 1 shows the breakdown of sales by buyer category for the most recent editions. Individual sales (orders of fewer than 10 books) account for 20% of books sold, even though they represent 90% of orders placed. The majority (80%) of our books are sold to bulk purchasers—utilities, wholesalers, corporations, and nonprofits—in orders of 100 or more. Bulk buyers most often buy the book to use as a give away to customers or constituents. In a recent survey of the 38 bulk buyers of the 8th and 9th editions, seven buyers, mainly from the utility

industry, specifically said the book comes in handy as a "leave-behind" after home energy audits. Other groups give the book away during conferences or other events or use it internally as either a reference or a gift for employees. Of the six groups who re-sell the book, including our co-publisher of the 9th edition, three are nonprofit organizations who use environmental expos, trade shows, and other events as sales outlets, and three are retailers who go through sales representatives or post the book for sale online alongside other consumer-oriented environmental resources.

Figure 1. ACEEE *Consumer Guide* (8th & 9th Eds.) Sales, October 2003 – February 2008
Total Books Sold: 25,263



Content from the *Consumer Guide* has also been available online since 1998, and these "Consumer Resources" pages have become a major source of Web traffic for ACEEE. For any given month, tips on water heating, heating (furnaces, boilers, and heat pumps), and another appliance, often refrigerators, consistently rank within the top five pages receiving the most unique visitors[1] on aceee.org. Central air conditioning tips join the top five pages during the summer.

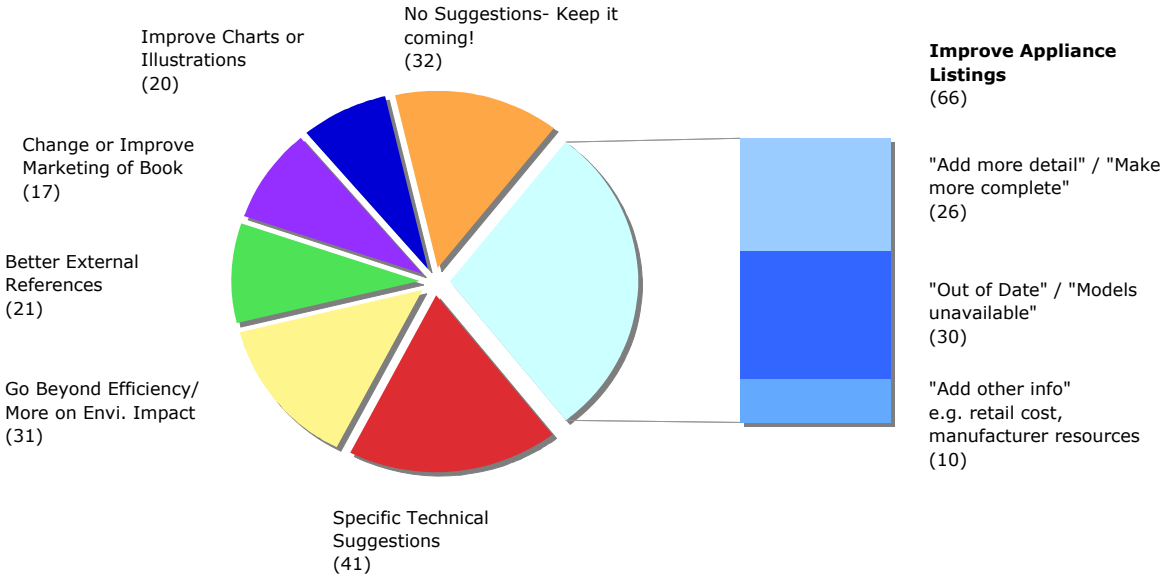
How Buyers Use the *Consumer Guide to Home Energy Savings*

ACEEE conducted a reader survey in 1999 (ACEEE 1999), which, although dated, offers some evidence of how the book and its content has served its readers. When asked to rank the usefulness of certain aspects of the book, survey respondents gave high marks in the "very useful" and "useful" categories for most aspects of the book. On average, readers reported that the book was responsible for 40% of the total actions they had taken to save energy, and that the book had the greatest impact on insulation, windows, refrigeration and heating measures. Over

[1] According to our Web statistics, a unique visitor represents the first visit from the same computer. If any person returns to the site again from the same computer, a visit is counted, but a *unique* visit is not.

60% of respondents reported the "most efficient" product listings to be "very useful." However, when readers were asked to volunteer suggestions for improving the *Consumer Guide* (Figure 4), the single most common specific comment was that the appliance lists were found to be out of date, lacking enough detail, and lacking resources to cross-reference model numbers, reliability data, or cost. Overall, suggestions for improving the appliance lists comprised nearly one third of the total suggestions offered, as shown in Figure 2.

Figure 2. Suggestions Offered for Improving the *Consumer Guide*
Total Responses: 173; Total Suggestions: 228



Partnerships with Press and Other Organizations

In addition to being a direct resource for consumers, the *Consumer Guide* allows us to refine how we communicate our technical expertise to the public via the news media or our partners in the energy efficiency, environmental, and consumer outreach communities. Over the past decade, ACEEE's media presence has grown substantially as we have cultivated a more extensive list of press contacts that recognize ACEEE as a reliable and reputable source of information on energy issues. Consumer-oriented reportage in national and local print and broadcast media has been an important part of ACEEE's overall coverage—more than 250 reporters regularly receive our press releases related to consumer energy issues. As a result, ACEEE staff have served as a source for hundreds of stories in newspapers, print and electronic magazines and journals, and local and national radio and television. In light of growing concern over climate change and rising energy prices, interest in energy efficiency has surged in recent years. Media outlets are seeking increasingly sophisticated information that is tailored more specifically to their audiences.

ACEEE's media efforts go beyond serving as a source for journalists. We have partnered with media firms, non-profits and other organizations to develop unique content for print, electronic and broadcast outlets. In addition to spreading ACEEE's message, these collaborative

efforts help us identify issues of interest to a diverse audience and to see what areas of our work resonate most with other organizations and individuals. Examples of these partnerships are provided in Figure 3.

Figure 3: Sample ACEEE Consumer Education Efforts

1990	Provided energy saving tips for *50 Simple Things You Can Do to Save the Earth*
1996	Provided content for CD-ROM on home energy savings developed by Apogee Interactive
2000	Contributed information on energy-efficient appliances and product lists for the Environmental Defense website ForMyWorld.org
2001	Presented information on educating consumers about appliance energy efficiency in a closed-circuit broadcast to more than 200 extension agents around the country organized by Virginia Tech
2006	*Consumer Guide* offered as membership pledge premium for Wisconsin Public Radio. Appeared as guest for one-hour call-in show in conjunction with pledge drive.
2007	Helped four families with a one-month "carbon diet" for a *National Geographic* story for a special issue on climate change
2008	Provided content for GreenMadeSimple.com—a website offering consumers information on saving energy, tailored links to utility rebates and local contractors and retailers, and a space for consumers to share stories of their own efforts to green their homes and vehicles *(under development)*

Incorporating Lessons Learned: Developing the Consumer Guide 9th Edition

Results from our experience suggest that ACEEE's consumer resources have been valuable and unique in addressing a general lack of up-to-date, complete, and specific recommendations for consumers on improving home energy efficiency. For the 2007 revision of the *Consumer Guide*, increased visibility for home energy savings, coupled with the availability of new consumer resources and more advanced understanding of home performance, required us to go beyond the basic fact-check revision to stay current. The following discussion summarizes our considerations, using examples from the revision, and identifies critical next steps for further improving consumer resources.

Consumer Needs

Our reader survey suggests that even consumers who presumably regard energy efficiency as important and describe the information in the *Consumer Guide* as "useful" may still easily fall just short of obtaining the information they need to actually follow through with a purchase that saves energy and is right for their home. Suggested additions and modifications that would have taken readers farther in their decision-making process—by providing more

detail, more clarity, or more context—were a theme among respondents to our readers survey. This result is not surprising considering the scope of the book and the intangible and site-specific nature of energy efficiency. Nevertheless, this result simply underscores the importance of testing and revising decision-making tools such as the "most efficient" product listings, to ensure they address current market barriers and misinformation in the marketplace. Our experience is corroborated by other research that has found that consumers who recognize the importance of efficiency do not necessarily prioritize energy savings or operating cost benefits during a purchase unless armed with "effective aids" (Egan and Brown, 2001).

However, there is limited research offering insight into how consumers make decisions and how to optimize consumer-oriented energy efficiency information. Key issues to address include: 1) how consumers perceive their options; 2) what motivates consumers to buy energy-efficient equipment; 3) what determines energy use patterns in the home; and 4) what tools or diffusion strategies are most successful in achieving specific outcomes.

A resurgence of interest in behavioral research and social marketing in the energy efficiency community offers new opportunities for using program evaluation and research to further align the format and content of resources like the *Consumer Guide* with the facts of market behavior. What we do know, based on our success with our "most efficient" product lists and our experience talking to consumers, is that consumers value tools that can lead them to easily identify the "right" thing to do or the "best" product to buy. We also know that every house is different, and that available metrics for ranking the "best" products can be inaccurate given certain operating conditions. We are left with a profound gap between the level of effort consumers can afford to spend and the level of energy savings that is possible for them to achieve. The following sections address some of the steps we are taking to better meet consumer needs.

Product Ranking

In the 9th edition of the consumer guide, we opted to remove the "most efficient" product listings from the book, and instead focus our resources on improving the quality and organization of the text. Primary reasons for our decision include:

- **Avoid duplication of efforts** In the years since we began to offer product listings, other parties (namely, ENERGY STAR, the Consortium for Energy Efficiency, and the key trade associations) have developed easily accessible, regularly updated product lists. In fact, the trade association lists are typically the same that ACEEE used in compiling our "most efficient" product lists. In addition, some trade associations have begun to charge fees for use of their product data in published lists. These resources along with the time we have spent repackaging these lists can now be directed toward other efforts.

- **Inconsistent model numbers** Increasingly, the model numbers for the same products differ from retailer to retailer. This makes it difficult for consumers to find the model numbers listed in the book based on published manufacturer data. This has been an issue with water heaters for many years and is becoming more common with other appliances.

- **Timeliness of lists** Product listings must be updated regularly to stay current with products on offer in the market. Obsolete product lists detract from the value of the

information and tools provided in the *Consumer Guide* which is designed to undergo revisions every two to three years, but can serve as a reliable reference for consumers even longer.

- **Product rating only one part of the efficiency equation** A product ranking list suggests to the consumer that they should pre-occupy themselves with specific brand names, model numbers, or efficiency specifications rather than a simpler set of features that they can tailor to their particular circumstances and use to achieve superior energy performance. In the case of HVAC, for example, it is well established that installation and sizing have an equal or greater impact on energy performance than rated efficiency.

Although we recognize that product listings are popular among consumers and can be valuable, we believe we that there are better ways to enable consumers to fully and accurately evaluate product options.

Revisiting Consumer Decision-Making: A Step in a New Direction

System efficiency. Due in large part to the success of standards and market transformation efforts over the past several decades, we have begun to reach a ceiling of efficiency gains achievable under traditional, "incremental" means of advancing energy efficiency. One example is the need to go beyond Seasonal Energy Efficiency Rating (SEER) in order to realize the next big opportunities in central air conditioning efficiency. In response, the energy efficiency community is beginning to explore systems-based efficiency solutions, social and behavioral dimensions of efficiency, and product specifications that better represent field performance.

For example, the need to effectively communicate the relative importance of product efficiency compared to contractor selection and quality installation (QI) is becoming a major focus of consumer-targeted market transformation programs like ENERGY STAR. These efforts are based on findings that, despite consumer awareness that contractors are an important element of the decision-making process when adding or replacing HVAC equipment, they are unaware of the importance of QI, or what questions to ask to ensure QI (Lawrence and Jenkins, 2000). Residential efficiency program experts also find that consumers rarely link building failure issues such as humidity, mold, high bills, or indoor air quality issues with poor equipment installation (Taylor, et al. 2006). While building scientists are practiced at understanding how a building operates as a whole system, it is unclear how receptive consumers are—or need to be—to this perspective.

How we frame efficiency and the decision-making process has enormous implications for how we decide what to tell consumers and how we organize the information. In the 9th edition of the *Consumer Guide*, the overall structure of the book strays little from the traditional organization of content into chapters by end use (lighting, heating, cooking, etc.). However, within key chapters, content was revised and re-shuffled to de-emphasize equipment efficiency as the logical starting point for making decisions. Advice on contractor selection and home energy audits were augmented and pulled to the front of the heating, cooling, and building envelope chapters. The cooling chapter was further rearranged to lead off not with equipment replacement options but with a discussion on how to reduce mechanical cooling loads. We also relegated our discussion on new windows from a stand-alone chapter to a shorter section within the building envelope chapter, due to the relatively low cost-effectiveness of window

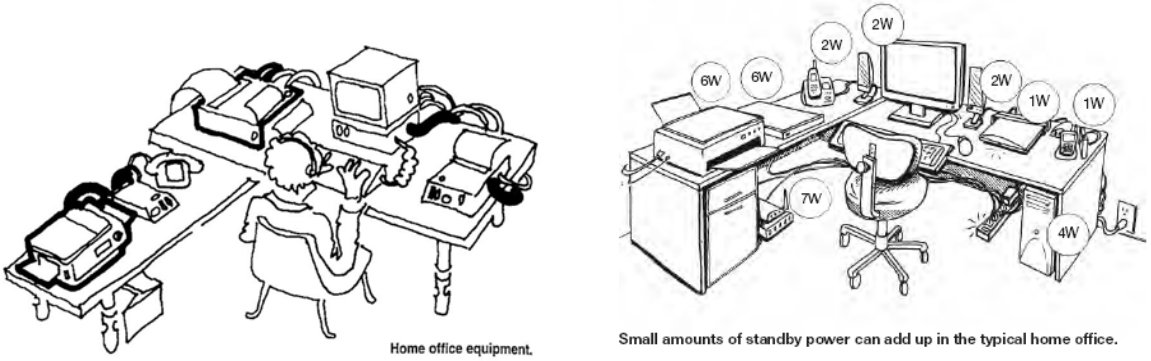
replacement. In addition, the chapter on improving the building envelope is followed by an entirely new chapter on ventilation and air distribution, which is intended to introduce readers to the importance of air-flow and whole-house efficiency.

The example of quality installation illustrates the dual challenge we face in providing consumers with the resources they need. Not only is there a need for developing and testing tools that get the right message across, but complete and accurate resources also involve a great deal of coordination across programs targeting all levels of the value chain. Because the consumer depends heavily on the contractor for equipment performance, more needs to be done to broaden the accessibility of qualified contractors, including home performance contractors and auditors. This should entail strengthening a national brand for quality installation; offering stronger incentives for contractors to enter the market; creating more "mid-stream" market transformation programs targeting contractors rather than consumers; and improving the credibility and reach of contractor listings.

Charting the decision-making path. To help readers establish a context and path for making decisions, the 9th edition of the *Consumer Guide* contains a 50% increase in charts and illustrations. Whereas product listings had assumed prominence in prior editions and illustrations had more of a decorative value, the new and re-formulated graphics are intended to do explanatory work and guide the decision-making process (see Figures 4 and 5).

Upgrades to the graphical content of the *Consumer Guide* included the addition of charts that lead a consumer step-by-step through decisions such as selecting the right kind of cooling system. The charts allow the reader to isolate important factors such as climate, region, existing fuel and distribution options. Illustrations and charts are also used to demonstrate the role of energy efficiency in protecting the environment and reducing home energy expenditures and to help readers prioritize their efforts.

Figure 4. Home Electronics Illustration: Pre-9th Edition vs. 9th Edition

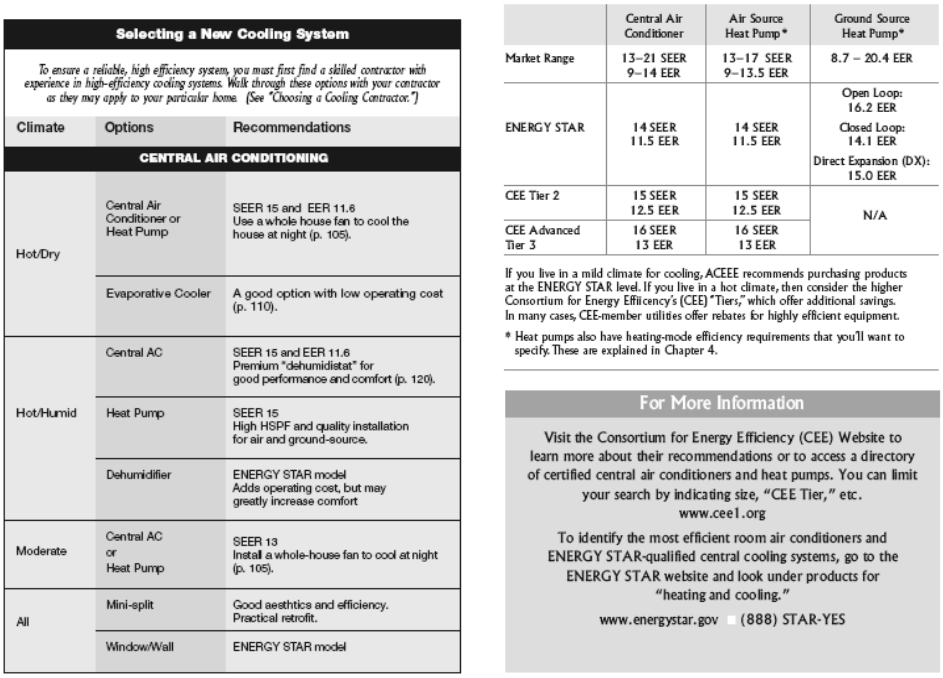


Revised illustrations were designed not only to bring information up to date, but also to be more descriptive.

In lieu of integrating product lists into the text, the book leaves readers with "for more information" references that identify the next steps they need to take. In most cases, these references take readers to regularly updated online product or contractor listings and manufacturer resources, such as those maintained by ENERGY STAR, Consortium for Energy

Efficiency, Building Performance Institute, and various trade associations. There are also frequent referrals to ACEEE's Web resources which are updated on a more regular basis and designed to walk consumers through specific steps of the decision process.

Figure 5. Decision-Making Tools in the 9th Edition



Selecting a New Cooling System

To ensure a reliable, high efficiency system, you must first find a skilled contractor with experience in high-efficiency cooling systems. Walk through these options with your contractor as they may apply to your particular home. (See "Choosing a Cooling Contractor.")

Climate	Options	Recommendations
CENTRAL AIR CONDITIONING		
Hot/Dry	Central Air Conditioner or Heat Pump	SEER 15 and EER 11.6 Use a whole house fan to cool the house at night (p. 105).
	Evaporative Cooler	A good option with low operating cost (p. 110).
Hot/Humid	Central AC	SEER 15 and EER 11.6 Premium "dehumidistat" for good performance and comfort (p. 120).
	Heat Pump	SEER 15 High HSPF and quality installation for air and ground-source.
	Dehumidifier	ENERGY STAR model Adds operating cost, but may greatly increase comfort
Moderate	Central AC or Heat Pump	SEER 13 Install a whole-house fan to cool at night (p. 105).
All	Mini-split	Good aesthtics and efficiency. Practical retrofit.
	Window/Wall	ENERGY STAR model

	Central Air Conditioner	Air Source Heat Pump*	Ground Source Heat Pump*
Market Range	13–21 SEER 9–14 EER	13–17 SEER 9–13.5 EER	8.7 – 20.4 EER
ENERGY STAR	14 SEER 11.5 EER	14 SEER 11.5 EER	Open Loop: 16.2 EER Closed Loop: 14.1 EER Direct Expansion (DX): 15.0 EER
CEE Tier 2	15 SEER 12.5 EER	15 SEER 12.5 EER	N/A
CEE Advanced Tier 3	16 SEER 13 EER	16 SEER 13 EER	

If you live in a mild climate for cooling, ACEEE recommends purchasing products at the ENERGY STAR level. If you live in a hot climate, then consider the higher Consortium for Energy Efficency's (CEE) "Tiers," which offer additional savings. In many cases, CEE-member utilities offer rebates for highly efficient equipment.

* Heat pumps also have heating-mode efficiency requirements that you'll want to specify. These are explained in Chapter 4.

For More Information

Visit the Consortium for Energy Efficiency (CEE) Website to learn more about their recommendations or to access a directory of certified central air conditioners and heat pumps. You can limit your search by indicating size, "CEE Tier," etc.
www.cee1.org

To identify the most efficient room air conditioners and ENERGY STAR-qualified central cooling systems, go to the ENERGY STAR website and look under products for "heating and cooling."
www.energystar.gov (888) STAR-YES

Thinking about Content

Finally, according to studies of consumer education, the effectiveness of an information tool like the *Consumer Guide* ultimately depends on the extent to which it corrects missing or misinterpreted information in the market (Stern 2007). Other policy and marketing strategies are available to mitigate market barriers other than lack of information, such as economic incentives and social marketing campaigns. As an information tool targeting individuals who are motivated to save energy at home, the *Consumer Guide* must stay effective by revisiting what new unrecognized efficiency opportunities may be worth communicating, and by anticipating points of misinformation or confusion in the marketplace.

The content of the *Consumer Guide* has evolved over the past two decades as new products and technologies enter the market and as the field of building science has evolved. As our partnerships with the press and other interest groups have grown, we have learned that keeping content current is as much about responding to consumer behavior and market trends as it is about checking technical accuracy.

With the surging public awareness of "green" issues, we added new content and informative illustrations in the first chapter to better communicate relative and big-picture impacts of energy efficiency in the home so that readers could consider these impacts at the beginning of their decision-making process. This includes consolidated information on CO_2, more discussion of carbon neutrality opportunities, and more detail on the impacts of electricity generation and fuel choice.

The authors also added a new chapter on consumer electronics in recognition of the prominence of these products as a significant end use in modern homes. In previous editions, consumer electronics were included in the chapter on "other" energy uses, a common perspective on home electronics that is now out-of-step with consumer behavior and energy use statistics. The new chapter clarifies power mode classifications and allows consumers to compare typical energy use figures for a range of electronic appliances.

Other areas that were substantially re-written concern technologies that may be familiar to energy efficiency aficionados, but have developed an entirely new relationship to the consumer. For example, the discussion on compact fluorescent lamps (CFLs) was extensively revised to address the fact that misinformation and dissatisfaction persist despite increased publicity about the energy savings benefits of CFLs. In an attempt to remain sensitive to consumer perceptions, the revised discussion emphasizes important characteristics of the technology (color temperature, product diversity, and mercury content) rather than simply stressing the interchangeability of CFLs and incandescent bulbs. We have also added brief notes on state-of-the-art technologies for those looking to push the envelope or get a preview of the products they will be hearing more about in the future.

Summary

From a somewhat haphazard entry into consumer education, ACEEE has developed a successful series of print and electronic resources providing information on home energy savings. While these efforts are an extension of our core mission of using technical expertise to drive advocacy for sound energy efficiency policy and programs, they have also helped drive broader visibility for ACEEE as a whole in the media and among other organizations promoting environmental and consumer issues. A recent revision of our flagship consumer resource, *Consumer Guide to Home Energy Savings*, led us to re-examine the types of information and recommendations we provide consumers using new information on technologies, marketing efforts, consumer behavior, and the emergence of a growing interest in green issues. While we are confident that these changes represent an improvement in our consumer education efforts, the process has uncovered useful areas of research to inform consumer materials developed by ACEEE and others. Specific feedback from consumers about their use of the book and other information resources, more systematic study of consumer behavior regarding the purchase and use of energy-consuming products, and investigation of opportunities to better coordinate and streamline the information offered by different market players including utilities, government agencies, public interest groups, manufacturers, and other market players are all warranted. Research findings would be of great value to improve the design of tools intended to help consumers navigate increasingly complex decisions about reducing home energy consumption.

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