



ROOM AIR CONDITIONERS 2007 PRODUCT SNAPSHOT

On behalf of:
U.S. Department of Energy
ENERGY STAR® Program



Prepared by:
D&R International, Ltd.

Product Quick Reference: Room Air Conditioners

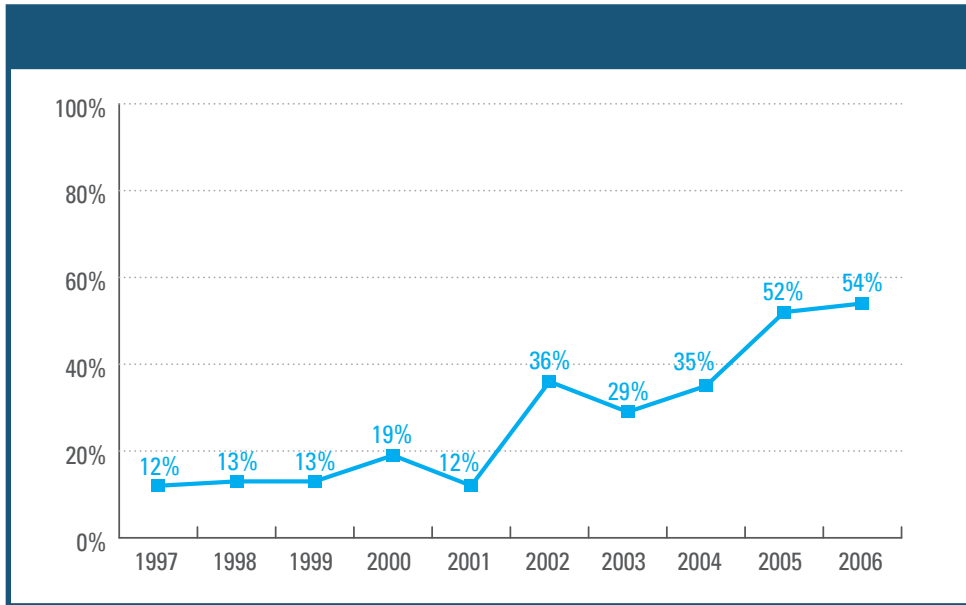


Figure 2: ENERGY STAR® Market Share by Census Division, 2006¹⁶

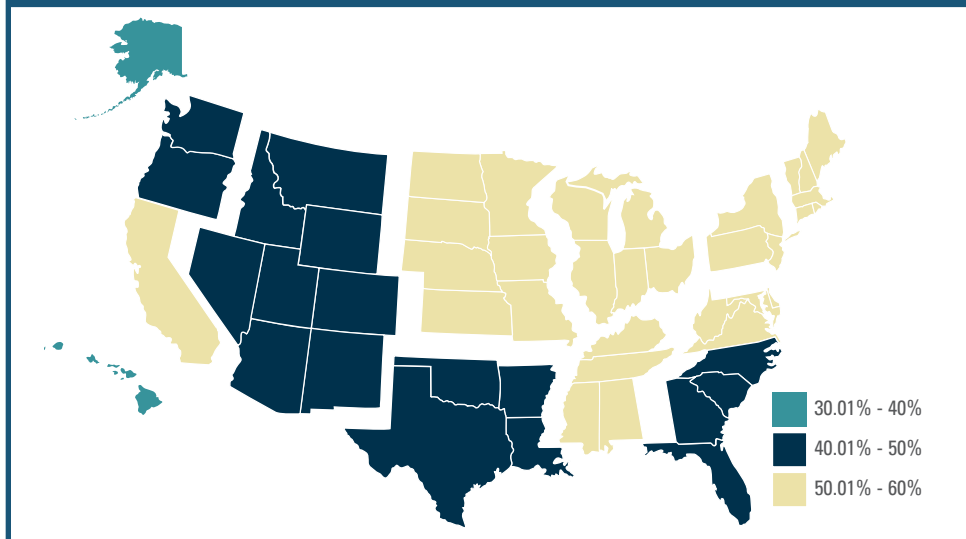


Table 2. Manufacturers of ENERGY STAR® Qualified Room Air Models¹⁷

Manufacturer	NUMBER OF PRODUCTS AVAILABLE AT LEVEL		
	Current Federal Standard	Current ENERGY STAR Level	Percent Qualified
Electrolux	82	65	79
LG Electronics	54	34	63
Friedrich	266	159	60
GE	180	107	59
Whirlpool	51	29	57
Haier	66	34	52
Fedders	82	39	48
Sharp	89	37	42
Samsung	134	41	31
Daewoo	47	12	26
Danby	110	25	23
All Manufacturers	1,161	582	50

ROOM AIR CONDITIONERS: *Peak Savings Opportunity*

ROOM AIR CONDITIONERS (RACs) ARE A SIGNIFICANT CONTRIBUTOR TO PEAK POWER DEMAND in regions of the country with hot and humid summers and older housing stock that frequently lacks central air conditioning. ENERGY STAR qualified RACs help reduce this load and provide energy savings for consumers.

While the energy and dollar savings from RACs may not rival those of ENERGY STAR qualified lighting or clothes washers, the peak demand savings can be compelling for Energy Efficiency Program Sponsors (EEPS) in many regions of the country. The following list summarizes key market facts, which are detailed further in this Snapshot, which policy makers and program managers may want to consider when developing RAC programs in 2007:

- **Promoting efficient RACs can be an effective strategy for EEPS to reduce peak electric demand, particularly in the Northeast, South Atlantic, and Upper Midwest.** According to U.S. Department of Energy (DOE) estimates, the almost 23 million qualified units sold since 1997 have saved 6,935 GWh, often during times of summer peak electric demand.¹ Peak savings are significant enough that even EEPS in temperate regions sponsor programs to increase the efficiency of the installed base. For example, the New York State Energy Research and Development Authority (NYSERDA) saved 47.6 MW of peak demand over six years by promoting ENERGY STAR qualified RACs.²
- **Decommissioning and replacing old unit yields the greatest savings.** A new ENERGY STAR qualified RAC uses only 20 kWh to 284 kWh less a year than a new, non-qualified unit, saving on average only 75 kWh per year. But when an older model is replaced with a new ENERGY STAR qualified RAC, savings are nearly double, ranging from 35 kWh to 492 kWh a year and averaging 132 kWh per year.³ Increasingly, more EEPS programs are offering incentives for consumers to recycle their old RAC units and purchase new ENERGY STAR qualified units.
- **The incremental cost of a new ENERGY STAR qualified RAC over a new non-qualified model is paid back in savings in less than four years.** On average, an ENERGY STAR qualified RAC saves \$7.64 a year over a non-qualified model.⁴ The average incremental cost of an ENERGY STAR qualified RAC over a non-qualified model is \$30.⁵ Replacing a model that is at least 10 years old with an ENERGY STAR qualified model saves an average of \$13.45 a year,⁶ taking little more than two years to pay back the incremental cost.
- **The market is growing.** About 27 percent of U.S. households have at least one RAC. RAC. Total U.S. shipments increased at an average annual rate of 9.2 percent between 2000 and 2006,⁷ resulting in overall growth of 55 percent during that time. Reasons for increased sales are further detailed below on page 3.
- **Sales training and improved point-of-purchase information on the correct sizing of RACs is essential.** To achieve maximum comfort and savings, the unit must be the right size for the room, but it can be difficult to dissuade consumers from purchasing the biggest unit they can afford. ENERGY STAR provides free messaging and a pocket calculator to assist EEPS in training retail staff to educate consumers on choosing an appropriately sized RAC.

HOUSEHOLD PENETRATION AND MARKET SIZE

According to Appliance Magazine, about 27 percent of all U.S. households had at least one RAC, and possibly a central AC as well, in 2006.⁸ In 2001, the most recent year for which Residential Energy

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Consumption Survey data is available, 23 percent of U.S. households used at least one RAC and no central air conditioning (see Table 1).⁹ An additional 800,000 households had central air conditioning and also used RACs.¹⁰

Table 1. Room Air Conditioners (RAC) Household Penetration (2001) and Shipments (2004) by Census Division¹¹

Census Division	HOUSEHOLDS			SHIPMENTS		
	with RAC* (Millions)	Share of All Homes (%)	Share of Homes with RAC* (%)	Unit Shipments (Thousands)	Change from 2000 (%)	Share of Total Shipments (%)
South Atlantic	2.8	14	12	2,552	117	25
Middle Atlantic	6.4	43	27	2,530	51	25
East North Central	4.1	24	18	1,282	-4	13
West South Central	2.2	19	10	1,069	39	11
New England	2.4	44	10	914	122	9
Pacific	2.2	13	9	659	107	7
West North Central	2.0	27	9	445	34	4
Mountain	0.7	10	3	304	140	3
East South Central	1.4	20	6	297	-17	3
All Divisions	23.3	23	100	10,052	55	100

Household saturation is high in the Northeast, Mid Atlantic, and Upper Midwest. Fewer homes in these regions have central air conditioners because summers are shorter and housing stock is older. When these areas do heat up, consumers are more likely to rely on RACs to meet their cooling needs. The high saturation of RACs in these regions means that RACs make up a larger portion of their summer peak demand.

The largest shipments of RACs go to regions of the country with hot and humid summers and older homes that are less likely to have central air conditioning. The Middle Atlantic and South Atlantic Census divisions together accounted for 42 percent of overall RAC shipments. The East North Central and West North Central Census divisions are also important markets for RAC shipments.

U.S. Shipments increased at an average annual rate of 9.2 percent between 2000 and 2006, resulting in an overall growth of the market of 55 percent over 2000 levels. In 2006, manufacturers shipped over 10 million RACs.¹² The precise sources of this impressive growth rate have yet to be determined, but there are several likely candidates. RAC sales are driven largely by the duration and severity of summer heat waves, and the summers of 2001, 2002, 2003, and 2006 were among the ten hottest in the US in the last 100 years.¹³ Other possible drivers include a transition in the perception of air-conditioning from a luxury item to an expected amenity and increases in the number of RACs in each household.¹⁴

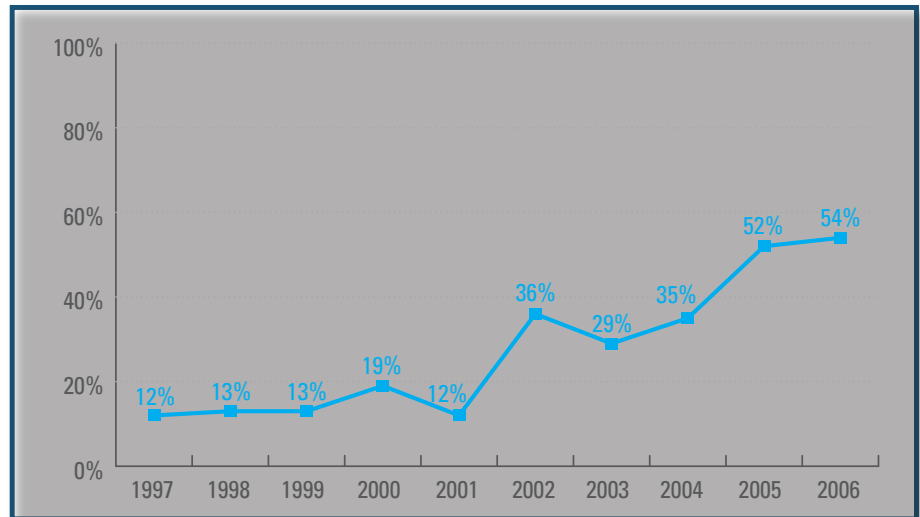
Shipments growth has been greatest in the Mountain, New England, South Atlantic, and Pacific Census divisions. As with national shipments growth, the precise sources of growth in these regions have yet to be determined, but one reason may be higher than average population growth in these regions.

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ENERGY STAR MARKET SHARE

ENERGY STAR market share has grown 50 percent since the program's inception (see Figure 1).

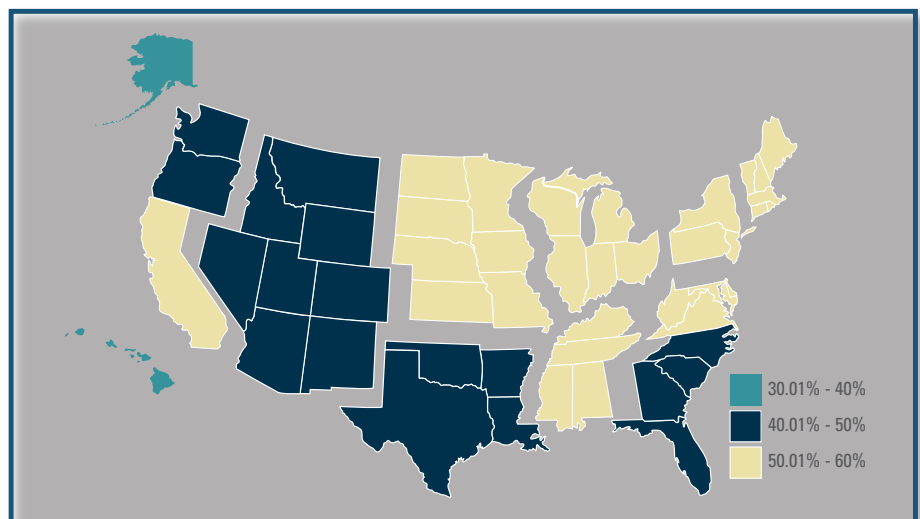
Figure 1: ENERGY STAR Market Share¹⁵



This large growth is due, in part, to long-running promotions by EEPS of ENERGY STAR qualified RACs. Although ENERGY STAR market share is already high throughout the country, promoting properly sized ENERGY STAR qualified RACs can still yield significant peak demand savings in regions with short but hot summers.

Market share is highest in New England and New York. Market share of qualified units was highest in New England at 60 percent and New York at 57 percent, and lowest in Alaska and Hawaii at 39 percent (see Figure 2). Regions of high ENERGY STAR market share tend to be regions where the climate offers EEPS a significant opportunity to promote ENERGY STAR qualified Room ACs and where EEPS are active in promoting ENERGY STAR in general.

Figure 2: ENERGY STAR Market Share by Census Division¹⁶



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The first ENERGY STAR criteria for RACs were announced in October 1996 and took effect in 1997. At that time, 22 models qualified, together accounting for 12 percent of RAC sales (see Figure 1). The first qualified RACs were introduced by eight manufacturers: Friedrich, GE, Amana, Carrier, Bryant, Electrolux, Samsung, and Fedders. Eleven manufacturers now manufacture ENERGY STAR qualified RACs (see Table 2).

In response to stricter federal standards, the ENERGY STAR criteria changed in October 2000 to be 10 percent more efficient than the new federal standard. DOE's January 2006 Five-Year Schedule for Issuance of Appliance Rulemakings indicated that the Department will be initiating a rulemaking to consider revisions to that federal standard. A final rule is expected by June 2011. **Another change to the federal standard may impact the ENERGY STAR program again.**

MANUFACTURERS

Eleven manufacturers produce ENERGY STAR qualified RACs under 35 different brand names (see Table 2). Friedrich and LG Electronics offer the largest number of ENERGY STAR qualified models, producing 159 and 107 models, respectively. As a percentage of total products offered, LG Electronics leads the way with 63 percent of its models meeting ENERGY STAR criteria. In all, one half of the RAC models offered by these 11 manufacturers are ENERGY STAR qualified.

During the last two years, several trends have negatively affected sales and profits for RAC manufacturers. Perhaps the most important is rising production costs. Manufacturers have recently faced higher prices of

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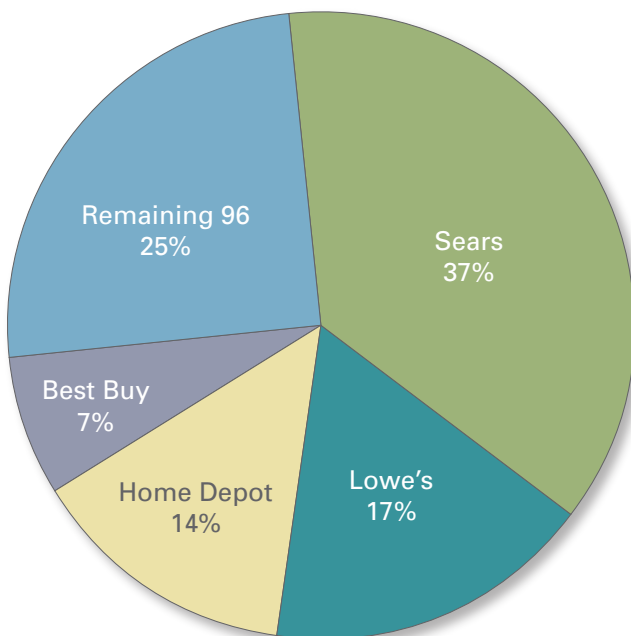
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raw materials, such as copper, aluminum, and steel; a shortage of compressors; and a federal mandate to use more costly power cords.

RETAILERS

Mass merchants accounted for nearly 35 percent of all RAC sales in 2005, followed by home improvement and electronics/appliance stores, with 29 percent and 16 percent of sales, respectively. A variety of other retailers make up the remaining sales, with Sears alone accounting for 15 percent.¹⁸ Sears, Lowe's, The Home Depot, and Best Buy together accounted for 75 percent of sales of all appliances by the top 100 appliance retailers in 2005 (see Table 3).

Figure 3: Market Share of the Top 100 Appliance Retailers, 2005¹⁹



BrandSource, Best Buy, The Home Depot, Sears, and Wal-Mart offer the largest selections of ENERGY STAR qualified RACs. Based on the RAC models available for sale through their Web sites, Lowe's offers the highest proportion of ENERGY STAR qualified RAC models (77 percent) as a percentage of total models offered, followed by Best Buy (60 percent), BrandSource (37 percent), and Sears (36 percent).

CHALLENGES AND OPPORTUNITIES FOR PROMOTING ENERGY STAR QUALIFIED RACS

Overall market interest in this product category has remained lower than for other ENERGY STAR qualified appliances, such as clothes washers and refrigerators, which offer greater year-round energy savings to consumers and EEPS and greater profits to manufacturers and retailers. Overall interest is also low because RACs tend to be an impulse buy dependent on

the weather. Other appliances usually entail more research before decisions are made, thus providing retailers and manufacturers with more of an opportunity to reach consumers prior to making a purchase. EEPS can increase interest in ENERGY STAR qualified RACs by coordinating promotions and turn-in events with retailers and manufacturers, giving them an opportunity to market to consumers.

The long retail lead-time for ordering products can make stocking ENERGY STAR qualified RACs difficult. Retailers must make purchasing decisions almost a year in advance. Without prior knowledge of how hot or cool a given summer will be, and the low individual savings of an ENERGY STAR model, retailers are often hesitant to stock large quantities of ENERGY STAR qualified RACs. As a result, EEPS must promote ENERGY STAR qualified RACs to retailers well in advance of the cooling season to affect stocking patterns. Offering extra incentives, such as rebates, can help encourage retailers to promote ENERGY STAR qualified RACs.

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Consumer perception that bigger is better hampers efficient sizing. An enduring challenge is ensuring consumers choose units that match the size of the space to be cooled. Correct sizing usually means choosing a smaller unit than consumers would tend to select otherwise. Correct sizing is essential to achieving maximum efficiency and comfort, but most retailers have found it difficult to communicate this information to consumers effectively. EEPS can make a significant difference by training retail salespeople on how to size a RAC correctly.

Recycling older models is an opportunity for savings. Models that are at least 10 years old use 20 percent more energy than a new ENERGY STAR qualified unit. Many EEPS are interested in retiring and recycling these old, inefficient units, since doing so would create the greatest energy savings. Old units that are not recycled are often moved to other rooms in the house where they continue to be used, or reconditioned and sold back into the market; either practice leads to the inefficient use of peak load power. EEPS can involve retailers in recycling by sponsoring turn-in events and campaigns with retail partners. These events help drive consumers to stores and encourage the recycling of old units and the purchase of new ENERGY STAR qualified models.

EEPS PROMOTIONS

ENERGY STAR qualified RAC promotions tend to be concentrated in parts of the country with hot and humid summers and older housing stock, including the Northeast, Upper Midwest, MidAtlantic, and Southeast. These promotions include turn-in incentives, marketing campaigns, and retail training. Most rebates offered are valued between \$25 and \$50. **Feedback from EEPS indicates that recycling promotions are the most cost-effective type of promotion.**

EEPS located in hot climates tend to offer year-round incentives. Sacramento Municipal Utility District, Turlock Irrigation District (CA), and Austin Energy (TX) offer mail-in rebates on ENERGY STAR qualified RACs throughout the year.

Table 4. Types of Activities EEPS Use to Promote ENERGY STAR Qualified RACs²¹

Consumer Outreach	Consumer Incentives	Manufacturer Outreach	Retailer Outreach
<ul style="list-style-type: none"> Multimedia advertising: direct mail, bill inserts, point of purchase signage, newspaper, TV and radio ads Free recycling pick-up and appliance recycling turn-in events Community outreach events and demonstrations Program Web sites 	<ul style="list-style-type: none"> Rebates Bounty paid for each appliance turned in at appliance recycling events 	<ul style="list-style-type: none"> Work with manufacturing partners to stock high-efficiency appliances Attend trade shows 	<ul style="list-style-type: none"> Regular updates on new programs for appliance vendors in service territory Free retail staff training on ENERGY STAR qualified appliances

Source: D&R International EEPS Regional Activity Summaries, Jan. 2007.

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EEPS in more temperate regions offer incentives in spring and summer, when most RACs are sold. Cape Light Compact, NSTAR Electric, and Efficiency Vermont, for example, will offer coordinated promotions between March 1 and July 31, 2007. They will also provide \$25 mail-in rebates for the purchase of an ENERGY STAR qualified RAC.

Other EEPS in the Northeast have been conducting long-running RAC turn-in events. For example, NYSERDA's Keep Cool program partnered with local retailers to sponsor turn-in events in which consumers received a bounty for each old RAC they brought in for recycling. The program was coupled with a multi-media marketing campaign. The program was so successful that the bounty payment was reduced in 2003 and phased out in 2004. NYSERDA continues its RAC marketing and outreach efforts in the Stay Cool! program.

From 2000 through 2005, the NYSERDA RAC program generated 47.6 MW of peak demand savings and saved 27.7 GWh per year. In total, 270,704 units were recycled during this period. This yielded a benefit-cost ratio for the total market effects test (TMET) of 1.6.²⁰ The Long Island Power Authority's (LIPA) Keep Cool Program (coordinated with NYSERDA) provided 67,000 rebates in 2002 from RAC turn-in events, reducing peak electricity demand by 24 MW over a two-year period. LIPA continued to promote RACs after rebates were phased out through the Stay Cool! campaign.²²

ENERGY STAR STRATEGY

DOE promotes ENERGY STAR qualified RACs by highlighting their dollar savings, environmental friendliness, advanced features, and quieter operation. DOE provides various kinds of support to EEPS, manufacturer, and retailer partners interested in promoting ENERGY STAR qualified RACs. This support includes providing messaging on consumer benefits and savings data in the ENERGY STAR Partner Resource Guides, providing retail training tools, creating marketing materials for partners, and coordinating joint recycling programs among EEPS. DOE's appliance recycling strategy also includes RAC recycling.

The Cool Your World campaign, an annual multimedia outreach campaign emphasizing the benefits of heating and cooling with ENERGY STAR qualified products, provides another platform for promoting ENERGY STAR qualified RACs. DOE provides support for this campaign in the form of RAC savings data and messaging. EEPS interested in participating in Cool Your World should contact their ENERGY STAR Account Manager.

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¹ D&R International Product Database, February 2007.

² NYSERDA. ENERGY SMART Program Evaluation: Chapter 5, Residential Programs. May 2006. Retrieved March 29, 2007, from http://www.nysERDA.org/Energy_Information/evaluation.asp. Further information about this program can be found in the "EEPS Promotions" section on page 6.

³ Ibid.

⁴ Ibid. Assumes 2006 national average electric rate of \$0.1019 per kWh and savings of 75 kWh per year.

⁵ "Life Cycle Cost estimate for 1 ENERGY STAR Qualified Room Air Conditioner." Retrieved March 30, 2007, from http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/RAC_savings_calc.xls.

⁶ D&R International Product Database, February 2007. Assumes 2006 national average electric rate of \$0.1019 per kWh and savings of 132 kWh per year.

⁷ D&R International Product Database, 2007.

⁸ "29th Annual Portrait of the U.S. Appliance Industry." September 2006. Appliance Magazine, p. P-7.

⁹ Note: Figures may not sum to totals due to rounding. Source: Residential Energy Consumption Survey, Energy Information Administration, 2001. Only households with one or more RAC units and no central AC are included. Data from the Association of Appliance Manufacturers (AHAM), gathered by D&R International, 2006 and 2000.

¹⁰ Ibid.

¹¹ Note: Figures may not sum to totals due to rounding. Source: Residential Energy Consumption Survey, Energy Information Administration, 2001. Only households with one or more RAC units and no central AC are included. Data from the Association of Appliance Manufacturers (AHAM), gathered by D&R International, 2006 and 2000.

¹² Data from AHAM, gathered by D&R International, 2007.

¹³ National Climatic Data Center. 2006 Annual Climate Review, U.S. Summary. Retrieved April 25, 2007, from <http://www.ncdc.noaa.gov/oa/climate/research/2006/ann/us-summary.html#temp>

¹⁴ US Census Bureau. American Housing Survey, 1999-2005. Retrieved April 24, 2007, from <http://www.census.gov/hhes/www/housing/ahs/ahs.html>

¹⁵ D&R International Product Database, 2007.

¹⁶ Data gathered by D&R International from ENERGY STAR retail partners, 2006.

¹⁷ D&R International Product Database, February 2007.

¹⁸ Rudnick, Michael. Major Gains in 2005. February 27, 2006. HFN, p. 63. Retrieved March 22, 2007, from Nexis database.

¹⁹ Wolf, Alan. June 8, 2006. "The Top 100 Major Appliance Retailers." Twice, p. 3

²⁰ NYSERDA. May 2006.

²¹ D&R International EEPS Regional Activity Summaries, Jan. 2007

²² Reed, Glenn. Northeast Energy Efficiency Partnerships. "The Northeast Residential ENERGY STAR Products Initiative." 2003.