Austin Electric Utility
Energy Star Program
Profile #11, 1992

Executive Summary

The Austin Energy Star program is a home energy rating system that has been implemented by the Environmental and Conservation Services Department in the City of Austin Electric Utility service area since the 1984-85 fiscal year. The program was one of many DSM programs conceived in response to a mandate by the Austin City Council that alternatives to purely supply-side options be developed.

The Energy Star program has been extremely successful in encouraging builders in the Austin area to incorporate energy efficiency into their new residential construction. Since its inception, about 75% of all new homes have been rated by Energy Star, and each year more builders sign up. Homes are rated on an open point scale that is representative of energy-cost savings that would be realized by the home as compared to a standard home built to the city's already strict energy code. Factors such as insulation type, glazings, solar screens, HVAC efficiencies, heat pump types, and fuel types are all considered in the generation of a rating for each new home.

Energy Star has been well-received by both volume and custom builders. Many prospective homebuyers now request an Energy Star rating, and builders advertise the ratings as an attractive and marketable aspect of their product. The program is designed so that volume builders can receive good ratings by making small cost-effective changes in their building plans, such as reducing window size. At the same time, custom builders can receive top ratings for incorporating efficiency into the total home design.

Much of the program's success can be attributed to the effective marketing strategies employed by the Environmental and Conservation Services Department. Frequent newspaper advertising, featuring lists of participating builders and architects, have been a mainstay of the marketing plan. This year, a home efficiency label designed to be placed near the main fuse box was introduced. The label is similar to the yellow home appliance efficiency labels with which consumers are familiar.

The program as a whole, however, has been successful due to the excellent partnership between the community and the Environmental and Conservation Services Department. The department, which is highly receptive to the needs of the community, also has the benefit of working in a city with a population that is especially conscious of environmental issues and is enthusiastic about opportunities to improve energy efficiency.

Energy Star Rating System

Utility:	City of Austin Utility Department
Sector:	Residential
Measures:	New home rating system based on building envelope, appliance efficiency, and other features
Mechanism:	Builders cooperate with the utility to have new homes rated for energy efficiency
History:	Started in 1985, will be incorporated into Green Builder program in 1993

October, 1991 - April, 1992 Program Data

Energy savings:	589 MWh
Lifecycle energy savings:	23,565 MWh
Peak capacity savings:	0.57 MW
Cost:	$95,000

Cumulative Data (1985 - 1992)

Cumulative energy savings:	11.77 GWh
LIfecycle energy savings:	120.4 GWh
Capacity savings:	2.93 MW
Cost:	$1,046,500
Participation rate:	~75%

Conventions

For the entire 1992 profile series all dollar values have been adjusted to 1990 U.S. dollar levels unless otherwise specified. Inflation and exchange rates were derived from the U.S. Department of Labor's Consumer Price Index and the International Monetary Fund's International Financial Statistics Yearbook: 1991.

The Results Center uses three conventions for presenting program savings. **Annual savings** refer to the annualized value of increments of energy and capacity installed in a given year, or what might be best described as the first full-year effect of the measures installed in a given year. **Cumulative savings** represent the savings in a given year for all measures installed to date. **Lifecycle savings** are calculated by multiplying the annual savings by the assumed average measure lifetime. Caution: cumulative and lifecycle savings are theoretical values that usually represent only the technical measure lifetimes and are not adjusted for attrition unless specifically stated.

Utility Overview

The Austin Electric Utility is a municipal utility that serves customers in the cities of Austin, West Lake Hills, and Rollingwood, Texas. Austin is the capital of Texas, and is also home to a University of Texas campus. There are no major industries in the utility service area, which has a total population of over 490,000 people. In 1990, the municipal utility provided electric service to 263,770 customers, 231,930 of whom were residential; 31,225 were commercial or industrial, and 615 customers were classified as "other".

The Austin Electric Utility has an extremely high reserve margin (77%). This situation is due in part to Austin's success at curbing peak demand through its many DSM programs. Power is generated primarily at three gas-fired steam turbine plants, and a coal-fired steam turbine in LaGrange. The Decker photovoltaic generating facility also provides 300 kW to the system.

Austin also has a 16% share in the 2.6 GW South Texas Project (STP) nuclear facility, representing about 15% of the utility's total generating capacity. After Austin had purchased its share in STP, demand for electricity slowed down, and city officials and citizens alike realized that additional supply provided by STP may not be needed. In fact, this has proven true, as demonstrated by the utility's high reserve margin.

AUSTIN 1990 STATISTICS

Number of Customers	263,770	
Energy Sales	6,365	GWh
Winter Peak Demand	1,322	MW
Summer Peak Demand	1,483	MW
Generating Capacity	2,620	MW
Reserve Margin	77	%
Average Electric Rates	6.87	¢/kWh

[R#1]

In 1981, the city was authorized by referendum vote to try to sell its share in the project. Efforts to do so were unsuccessful, however, and Austin began to look for ways to recover the costs of the unneeded STP. To this end, the Austin Electric Utility contracted with Rocky Mountain Institute to complete a study of the potential costs and savings associated with DSM. The study was completed in 1987, concluding that regardless of the commitment to STP, customer costs could be kept down and significant energy savings realized if the utility pursued DSM to its fullest. [R#12]

Utility DSM Overview

The City of Austin Electric Utility (Austin) has implemented several DSM initiatives in the past several years. In 1983, the Austin City Council mandated that any new demand be met through conservation measures. As a result, the City of Austin Energy Management Department, which is now encompassed within the Environmental and Conservation Services Department, began conceptualizing and implementing DSM in order to "construct" a "Conservation Power Plant".[R#2] Austin's DSM programs are no longer tied to the Conservation Power Plant concept. With the utility's high reserve margin, new demand could easily be met with existing capacity. Nonetheless, Austin has vigorously pursued DSM; many of Austin's customers are concerned about the environment and thus have been instrumental in promoting energy conservation projects. Through DSM, Austin has been able to keep its customers' utility bills down and forge a successful path toward becoming an energy efficient city.

AUSTIN ELECTRIC UTILITY DSM PROGRAMS

RESIDENTIAL PROGRAMS
- Loans
- Appliance Efficiency Program
- Whole House Program
- Energy Star New Home Efficiency Rating
- Direct Weatherization
- Multifamily Rebates
- Trees for Energy

COMMERCIAL PROGRAMS
- Appliance Efficiency Program
- Commercial Energy Management Program -- Menu Rebates
- New Commercial Construction Program
- Gas-Efficiency Programs
- Residential Weatherization
- Commercial Heating

[R#3,15]

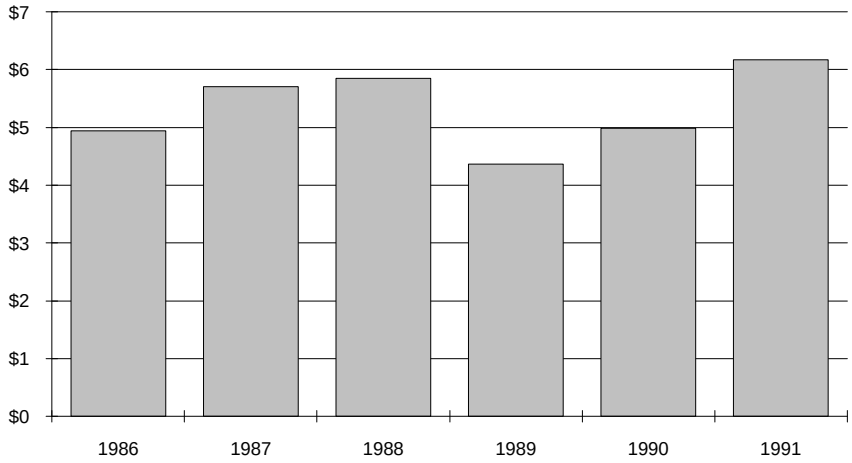
Utility DSM Overview	Annual DSM Expenditure (x1000)	Annual Capacity Savings (MW)
1986	$4,937	20.84
1987	$5,706	13.27
1988	$5,851	12.90
1989	$4,363	11.69
1990	$4,990	21.61
1991	$6,170	26.56
Total	$25,846	80.31

[R#3,15] Note: Years are fiscal year Oct. 1 - Sept. 30

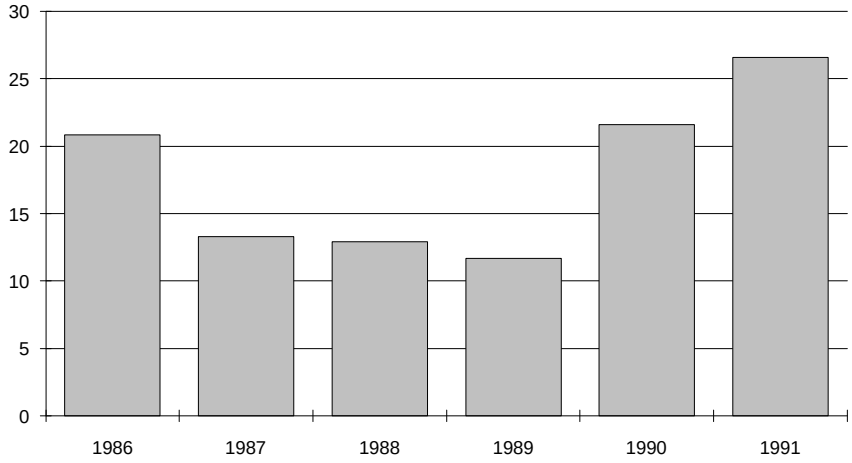
All DSM programs are administered through the city's Environmental and Conservation Services Department. One of Austin's most popular programs, in terms of participation, is the Appliance Efficiency Program (AEP) for both residential and commercial customers. More than 80,000 customers have participated in AEP since the program inception in 1982; about 10,000 commercial and more than 70,000 residential rebates were paid between 1982 and 1990. Through AEP, rebates are provided for efficient air conditioning projects in existing and new buildings. For residential customers, the program is further separated into single and multi-family. In 1990, rebates for commercial HVAC projects ranged from $100 to $300/kW.[R#5]

In addition to the Appliance Efficiency program, commercial customers can receive menu rebates for lighting retrofits, building envelope enhancements, motor replacements, and refrigeration improvements. All commercial customers are eligible for free energy surveys, which are sometimes required prior to rebate application approval.

ANNUAL DSM EXPENDITURE ($1,000,000)



ANNUAL DSM CAPACITY SAVINGS (MW)



Between 1982 and 1990, many of Austin's residential customers participated in a residential energy audit program, with over 45,000 audits conducted through 1990.[R#3] Active programs for residential customers include a loan program, a direct weatherization program, the Energy Star home efficiency rating program (the subject of this profile), and a seasonal "Trees for Energy" program. A multifamily rebate program was initiated in 1989-90.

There is some overlap among Austin's DSM programs. For example, participants in Energy Star may also qualify for rebates under AEP. Savings that result from appliance efficiency incentives are attributed to AEP, and not Energy Star, even though it is recognized that these AEP savings are due to Energy Star.[R#4]

The Environmental and Conservation Services Department conducts extensive analysis of its DSM programs. A monthly report is generated which includes graphs of participation, savings, rebates, and loan distributions. Additionally, the Department performs a detailed analysis of requests to its customer service hotline. From this information, the Department can determine trends in customer interests in the DSM programs and other services offered.[R#6]

Program Overview

The Energy Star program was developed over the course of several years and continues to evolve today. The program promotes the construction and purchase of energy-efficient homes through a rating system that is becoming widely recognized throughout the Austin service area. Plans for the program are to extend the rating to encompass all environmental impacts of a home. It is expected that the expansion of the program will be achieved in the next few years (see box). Energy Star is comprised of two main components: rating new homes and marketing the program. As the program has grown, builders have taken over more of the marketing responsibilities, with much of their advertising featuring Energy Star ratings as an attractive component of their new homes.

Any new-home builder constructing within Austin's service area may sign up with the Environmental and Conservation Services Department for inclusion in the program. Energy efficiency ratings are based on the submission of plans by the builder and about 40% of the homes are personally inspected by program staff. A computer software program developed specifically for the Energy Star program accepts data about the home and generates a rating based on energy savings as compared to a home built to minimum city energy-code standards. All homes within Austin's service area must comply with the city energy code, and any home receiving a one-star Energy Star rating may at the same time be certified for compliance with the code.

Energy Star was designed to be simply implemented, accurate, and marketable. When it was first started in 1985, ratings were calculated from a worksheet with a checklist format. By 1987, program software had been developed to perform calculations and to generate reports. The Building Energy Thermal Analysis (BETA) program remains the primary rating tool for the Energy Star program.

The BETA program generates ratings from one to three stars, based on the efficiency features of each home. Typical one-star homes have good HVAC efficiencies, higher than normal insulation levels, and improved shading. Three star homes incorporate efficiency into the design of the home, and include equipment with optimal efficiency ratings.

Note: Above from [R#2,7]

THE GREEN BUILDER PROGRAM

In 1993, the Energy Star program will be incorporated into the more comprehensive Green Builder program. Like Energy Star, Green Builder will encourage construction of energy-efficient homes. However, additional factors will be considered in the rating process, including water-efficiency, material safety, and solid-waste disposal options.

The requirements for builder participation will be more stringent under the Green Builder program than Energy Star. Builders will be required to attend a half-day seminar prior to being enrolled in the program, and will then have to agree to attend at least one technical seminar per year, on such subjects as rainwater harvesting, greywater, heat pump technology, insulation, and recyclable products. In addition the Environmental and Conservation Services Department will provide support to builders by assisting in obtaining materials or in locating design assistance as needed. [R#8]

In June, 1992, the Green Builder program was selected as one of 12 in the International Council for Local Environmental Initiative's "Local Government Honours Programme."

MARKETING AND DELIVERY

The Energy Star new-home efficiency rating program is implemented under the direction of Doug Seiter, Energy Star Program Manager, and Michael Myers, Manager of Energy Services, who directs all of the city's DSM programs, including Energy Star and Green Builder. Department staff worked together with local builders in developing the program. The first ratings were begun in the 1985-86 fiscal year. Through an extensive marketing effort, The Energy Star Program has successfully increased homebuyer demand for energy-efficient homes, and builders have responded to this demand by supplying such homes.

Advertising is generally done in local newspapers and real estate publications. Most advertisements include a brief description of the Energy Star rating system and a list of builders who are participating. Past advertisements showcased the "Energy Star Home of the Week", describing specific energy saving features and including directions to view the home.[R#2] These marketing tools have made participation in the program attractive to local builders, who benefit from the free promotion. In fact, most builder enrollment has been a result of builders wanting to be included in the program's marketing effort.[R#9]

An energy guide label was introduced in 1991. The label was designed to appear similar to the appliance efficiency labels that consumers have come to recognize thanks to federal legislation. A decal has also been designed for placement in the front window of rated homes to prompt prospective homebuyers to look for the energy guide label, which is usually placed near the circuit breaker panel or the air conditioning closet.

Any builder constructing homes in Austin's service area is eligible to participate in the program. Requests for ratings may come from the builder or builder representative, real estate agent, homebuyer, or mortgage lender. Before a builder may participate, a program agreement stipulating the terms of participation is signed.

The terms include obligations of both the builder and the city. Within 30 days of the agreement, builders must supply to the Environmental and Conservation Services Department a set of architectural drawings, mechanical equipment efficiencies, and other relevant information on homes under construction. Ongoing participants usually submit plans for rating prior to initiation of construction. The builders are allowed to use the Energy Star logo, participate in seminars, and are eligible for special recognition. After the agreement is signed, a welcome letter is sent to the builder, again outlining builder responsibilities and benefits.

Most ratings are accomplished based on the information provided by the builder. However, 40% of all rated homes are verified by field inspections. Because the rating system may be used as alternate compliance with the city Energy Code, all such homes must be personally inspected. These are included in the 40% figure.[R#7] Mr. Seiter reports few problems with correlation between plans submitted by the builders and final construction.

Information about the building to be rated is entered into the BETA software program, which was designed specifically for the Energy Star program. The BETA program calculates kW and kWh savings for each home as compared to a standard home that would meet energy-code minimums, and generates a rating. Homes receiving a rating of 100 to 250 points are eligible for one star, from 250 to 400 points receive two stars, and ratings of 400 or greater receive three stars. The standard home used for comparison purposes would receive a 0 point rating by the BETA program. This standard home is representative of a home built to the Austin Energy Code.

The point system correlates to the estimated energy costs of the home. A one star home is estimated to save 5% in energy costs over a home built to minimum code standards. Two star homes are projected to save 12.5%, and three star homes are likely to save 20% over the reference home. Expected capacity savings for one, two, and three star homes are 0.8 kW, 1.6 kW, and 3.0 kW, respectively.

After the rating is complete, the builder is sent a copy, along with decals and an Energy Guide Label. All ratings are available to the public regardless of the score, and Energy Guide labels are provided for each home.

MEASURES INSTALLED

A variety of measures are included in the Energy Star program. New homes are rated based on appliance efficiency, building envelope characteristics, and other factors. The following data are required for generation of a rating: [R#7]

- Architectural drawings with site orientation
- Area of conditioned space
- Fuels used
- Air exchange rate (optional for credit)
- Insulation R-values
- Sheathing type and thickness
- Roof radiant barrier inclusion
- Window type
- Solar screen inclusion
- Attic ventilation information
- Appliance fuel usage
- AC SEER
- Heat pump COP

STAFFING REQUIREMENTS

The Energy Star Program is administered by three people -- the manager and two assistants. The manager and one grant-funded assistant also concurrently work on the development and implementation of the new Green Builder program. Additionally, the Environmental and Conservation Services Department usually has one or two student interns who also assist with Energy Star.

Each rating takes between 1 and 9 hours, dependent upon the specifics of the home. Rating time includes the following tasks: consultation with the home builder, if necessary; data compilation from plans or site inspection; inspections for energy code compliance, if requested; data entry and computer analysis; and report preparation. Builder contact and general marketing are also included in the total time estimate.[R#9,10,15]

Monitoring and Evaluation

MONITORING

Ratings generated through the Energy Star program are based on plans and site inspections. Data are entered into the BETA program, which is capable of tracking overall program results. The BETA program is the main monitoring tool used by the Energy Star program. The Environmental and Conservation Services Department is able to maintain a current list of all rated homes, as well as builder participation records and average rating information for each builder.

EVALUATION

The BETA program determines energy savings of a home by simulating hourly energy use. BETA generates information on heating, cooling, water heating, and appliance energy usage and costs. Several evaluations of the BETA program have been performed in an effort to qualify the accuracy of its simulations. One evaluation determined that with carefully selected entry of variables that determine usage patterns, BETA was capable of accuracy within 3% of actual usage. Most simulations, however, are based on estimated lifestyle factors and usage patterns, causing a wider variation between actual and estimated energy consumption.

In 1989, Energy Star conducted a survey of the owners of rated homes. The survey quantified actual homeowner usage patterns and enabled further comparison of BETA estimates with actual usage. The survey revealed that some of the values used in the BETA program were inaccurate. For example, BETA assumes four occupants, while the average for the survey was three. Additionally, the survey revealed that homeowners use a number of differing heating and cooling setpoints, making it difficult to accurately assign a figure for use in the BETA model.

Nonetheless, the survey concluded that the figures generated by BETA accurately reflect an average. Evaluation of the thirty-seven responses received revealed that as a whole, the BETA program tended to underestimate actual gas savings, while the average annual kWh usage for all 37 respondents was almost exactly the same as what had been projected. Based on the results of the survey, appropriate adjustments in input data have been made to further improve the accuracy of BETA's predictions.[R#2,15]

The BETA program is now used to generate comprehensive monthly reports. These internal documents report monthly and year-to-date figures on number of homes rated, projected monthly energy savings, projected energy-cost savings, average savings per project, average square footage per project, and on- and off-peak energy and capacity savings. The monthly reports also track builder participation and average ratings for each builder.

The measures included in the Energy Star rating are reevaluated as new technical information arises. For example, when program managers looked at data showing that poor duct work could effectively negate the efficiency of high SEER air conditioning systems, they decided to incorporate duct work design into the rating program.[R#15]

DATA QUALITY

While the Energy Star program has been in operation since 1985, the most recent data is the most reliable according to Mr. Seiter. The introduction in May, 1987 of the BETA program for generating ratings may affect the comparability between current figures and early results. In the first year and part of the second year, Energy Star ratings were calculated using a worksheet. New homes received ratings based on a comparison between the worksheet calculations for the new home with those for a typical home built in 1983.

Subsequently, Austin instituted an energy code which specified minimum energy features for new homes in most of the Austin Electric Department service area. When the BETA program was introduced, the reference home was changed to an equivalent home built to the new energy code. Additionally, the BETA program allows alteration of the reference home as energy codes change. Thus, as the energy code becomes more stringent, apparent energy savings due to implementation of energy-efficient features will decrease.

Energy savings estimates were available only for the current fiscal year. The Results Center calculated energy savings for the years 1985 to 1990 based on a ratio of peak capacity savings in each year as compared to the ratio of energy savings to peak capacity savings for 1991-92. This extrapolation is valid because assumptions used by Austin in calculating peak capacity savings have not changed significantly since 1985.

It should also be noted that energy and capacity savings due to efficient air conditioning systems are not included in the savings figures presented in the Savings Over Table and accompanying charts (pg.12). These savings are attributed to the Environmental and Conservation Services Department's Appliance Efficiency Program. To avoid double-counting, the savings figures provided by the Department for Energy Star do not include these air conditioning savings. An estimate of projected savings including air conditioning is provided in the Program Savings section of this profile.

The Energy Star budgets for the years 1985-86 through 1990-91 were calculated by The Results Center based on dollars per kilowatt figures multiplied by capacity savings in kilowatts. These figures were estimated by Austin and they include savings derived from avoidance of 7.0% line losses as well as a 20% utility reserve margin requirement. Costs include only direct program costs, and do not include certain personnel costs, such as staff from the City of Austin Fiscal and Planning and Evaluation departments.[R#3] The 1991-92 costs were provided directly by Mr. Myers.

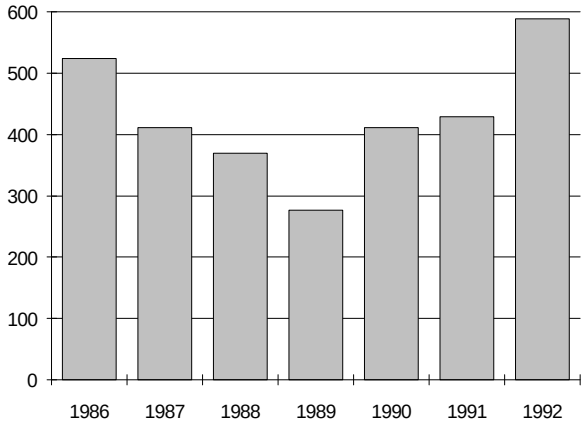
Because Austin has not calculated a measure lifetime for Energy Star, The Results Center used 40 years in calculating lifecycle savings in the Savings Overview Table and cost of saved energy in the Cost of Saved Energy Table (pg.14). While some of the measures included in the Energy Star program will last the life of the home (eg insulation, site orientation), others may have shorter lifetimes in the 15 to 25 year range (eg windows, air conditioners).

Program Savings

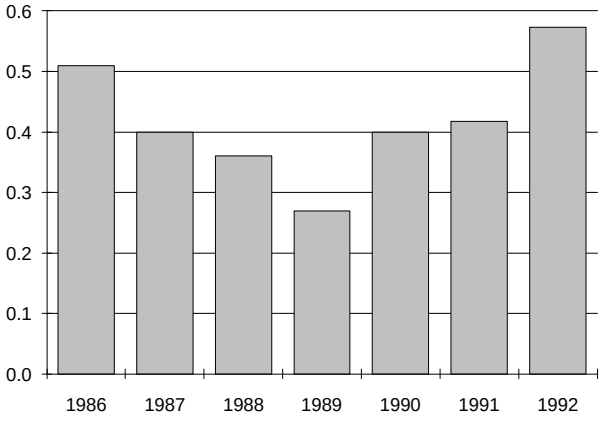
Savings Overview Table	Annual Energy Savings (kWh)	Cumulative Energy Savings (kWh)	Lifecycle Energy Savings (kWh)	Annual Summer Peak Capacity Savings (MW)	Cum. Summer Peak Capacity Savings (MW)
1986	524,000	524,000	20,960,000	0.51	0.51
1987	411,000	935,000	16,440,000	0.40	0.91
1988	370,000	1,305,000	14,800,000	0.36	1.27
1989	277,000	1,582,000	11,080,000	0.27	1.54
1990	411,000	1,993,000	16,440,000	0.40	1.94
1991	429,000	2,422,000	17,160,000	0.42	2.36
1992	589,130	3,011,131	23,565,000	0.57	2.93
Total	3,011,131	11,772,131	120,445,000	2.93	

[R3#,15]

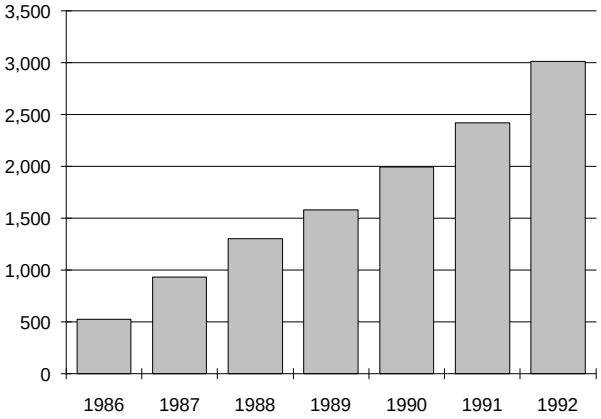
ANNUAL ENERGY SAVINGS (MWH)



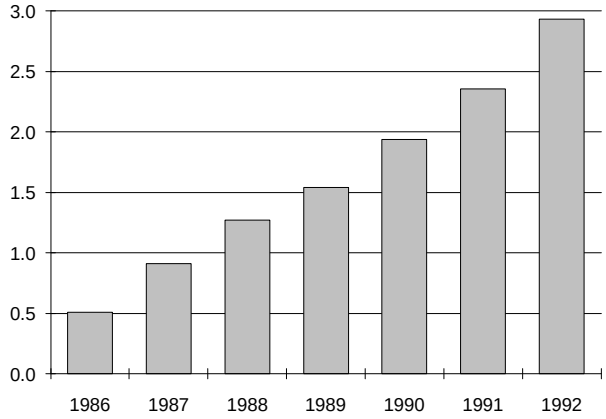
ANNUAL PEAK CAPACITY SAVINGS (MW)



CUMULATIVE ENERGY SAVINGS (MWH)



CUMULATIVE PEAK CAPACITY SAVINGS (MW)



NOTE: All 1992 figures for the charts and tables in this section are for October 1991 - April 1992; all other years refer to fiscal year October 1 - September 30.

PARTICIPATION RATES

Most of the area's builders are participating in the program, however, some builders sign up and then have only one home rated. About 75% of all new homes that have been built in the Austin area between 1985 and 1992 have received an Energy Star rating. In 1990-91, approximately 90% of all new homes participated in the program.[R#9,15] By April of fiscal year 1991-92, 472 homes had been rated.[R#6] Participation for the full fiscal year is expected to be between 750 and 850.

From 1986 to 1992 the savings per home have nearly doubled. This significant jump is due in part to the changes in the methods of generating ratings and calculating savings. Additionally, as customer demand for efficient homes has grown, builders have responded with more efficient homes -- more two star homes are being built, and the average SEER for new air conditioners installed has risen to about 12.0. (The local code requires a SEER of 9.0.)[R#15]

Savings per Participant Table	Participants (Number of Energy Star homes built)	Annual Energy Savings per Participant (kWh)
1986	792	662
1987	616	667
1988	556	665
1989	418	663
1990	619	664
1991	547	784
1992	472	1,248
Total	3548	

MEASURE LIFETIME

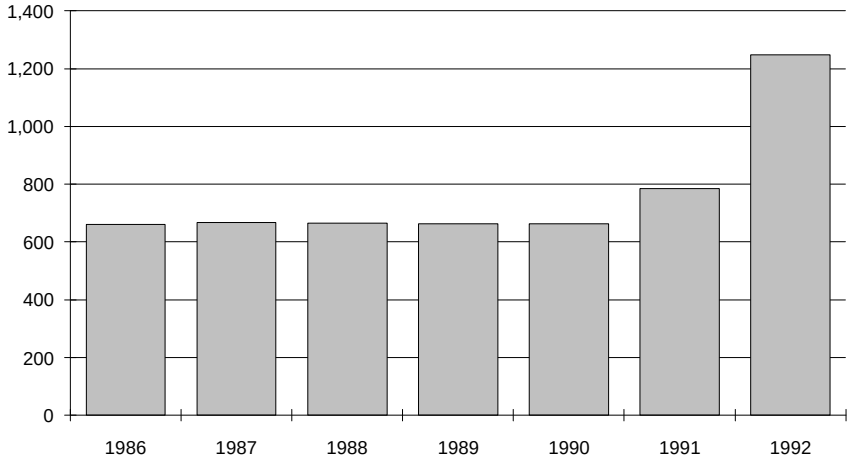
The Environmental and Conservation Services Department has not determined a lifetime for Energy Star. Savings from Energy Star result from measures with a variety of lifetimes. The Results Center used 40 years in calculating lifecycle energy savings in the Savings Overview Table (left), and in determining the cost of saved energy in the Cost of Saved Energy Table (pg. 14).

PROJECTED SAVINGS

Projected savings for the Energy Star Program were calculated based on low and high scenarios in 1990. The low scenario projected an annual capacity savings of 1.83 MW by the year 2000, with cumulative capacity savings of 18.00 MW. The high scenario projected 2.71 MW annual capacity savings in 2000, with cumulative capacity savings of 22.55 MW.[R#11]

As discussed in the Data Quality section, these figures do not include savings from air conditioning efficiency. If savings due to air conditioning were included, the predictions for annual capacity savings by the year 2000 would be about 2.8 MW for the low scenario and about 4.0 MW for the high scenario.[R#15]

ANNUAL ENERGY SAVINGS PER RATED HOME (KWH)

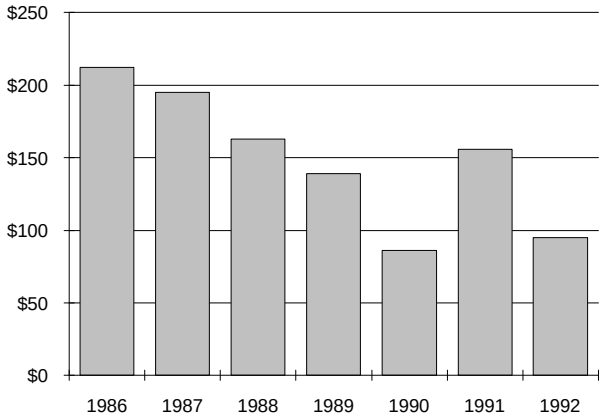


Cost of the Program

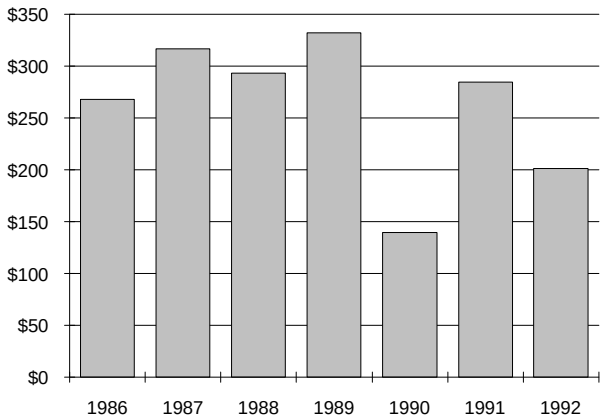
Costs Overview Table	Administration (x1000)	Advertising Cost (x1000)	Other Costs (x1000)	Total Program Cost (x1000)	Cost per Participant
1986	$144.8	$41.2	$26.2	$212.3	$268
1987	$133.1	$37.9	$24.1	$195.1	$317
1988	$111.3	$31.7	$20.1	$163.1	$293
1989	$94.8	$27.0	$17.2	$138.9	$332
1990	$59.0	$16.8	$10.7	$86.4	$140
1991	$106.3	$30.2	$19.2	$155.8	$285
1992	$64.8	$18.4	$11.7	$95.0	$201
TOTAL	$714.1	$203.1	$129.3	$1,046.5	

[R#3,15]

TOTAL PROGRAM COST (x1,000)



COST PER PARTICIPANT



Cost of Saved Energy Table (¢/kWh)	Discount Rates						
	3%	4%	5%	6%	7%	8%	9%
1986	1.75	2.05	2.36	2.69	3.04	3.40	3.77
1987	2.05	2.40	2.77	3.16	3.56	3.98	4.41
1988	1.91	2.23	2.57	2.93	3.31	3.70	4.10
1989	2.17	2.53	2.92	3.33	3.76	4.20	4.66
1990	0.91	1.06	1.23	1.40	1.58	1.76	1.95
1991	1.57	1.83	2.12	2.41	2.72	3.05	3.38

NOTE: All 1992 figures for the charts and tables in this section are for October 1991 - April 1992; all other years refer to fiscal year October 1 - September 30.

COST EFFECTIVENESS

The cost of the Energy Star program compares favorably with Austin's 1990 average electric rate of 6.8 ¢/kWh. Based on 40 year lifetimes, and with energy savings estimated as described in the Data Quality section, cost of saved energy has remained below 5 ¢/kWh, with discount rates between 3% and 9%. At a 5% discount rate, the cost of saved energy has remained below 3 ¢/kWh for all years of program implementation. (Cost of Saved Energy Table, left)

The Austin Environmental and Conservation Services Department also uses a dollar cost per kW of capacity saved to determine cost effectiveness. This measurement is derived from the fact that Austin's DSM program goal is to eliminate the need for a new power plant. Austin has estimated the present value cost for construction of a new gas-turbine power plant in the year 2000 at $402/kW. The cost per kW for the Energy Star program has fluctuated since its inception, due in part to changes in accounting practices. This cost peaked at $488/kW in 1988-89 but then dropped to its lowest level of $216/kW in 1989-90. The 1990-91 cost was $394/kW.[R#3,15]

COST PER PARTICIPANT

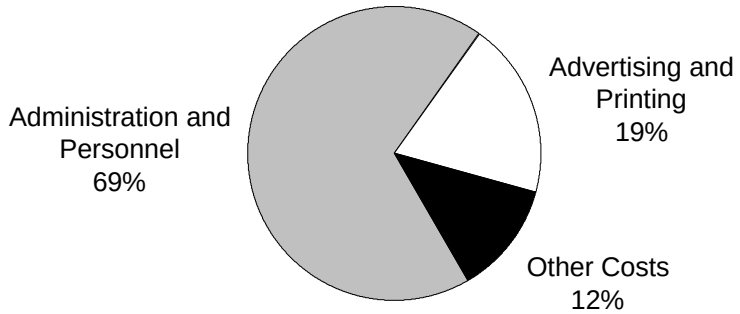
The cost per rated home has increased from the low of $140 in 1989-90 to $285 in 1990-91. Current costs through April, 1992 indicate a cost of $201 per rated home. If 850 homes are rated by the end of the year, as projected by the Environmental and Conservation Services Department, and if expenditures do not deviate from the budget, then the 1991-92 cost per rated home will be $191. (Table D)

FREE RIDERSHIP

Free ridership is not considered an issue in the Energy Star program and is therefore not accounted for, or discounted for, in the Energy Star program. While there are certainly some builders who would be building energy-efficient homes even in the absence of the program, their participation enhances the program without adding significant cost.

COST COMPONENTS

Virtually all of the program costs go toward marketing and administration. Some expenditure also occurs in the planning, evaluation, and marketing departments. Marketing and personnel costs in 1991-92 were budgeted at 20% and 70% of the total program costs, respectively; the remaining 10% being allocated to miscellaneous costs. These breakdowns were used in determining the respective cost components for previous years. It should be noted, however, that as is typical, marketing costs were significantly higher in the early years of the program. As more builders market their Energy Star ratings in their own advertisements, Energy Star marketing costs are expected to decrease even further.



Environmental Benefit Statement

Marginal Power Plant	Heat Rate BTU/kWh	% Sulfur in Fuel	CO2 (lbs)	SO2 (lbs)	NOx (lbs)	TSP* (lbs)
Coal	**Uncontrolled Emissions**					
A	9,400	2.50%	25,381,000	602,000	122,000	12,000
B	10,000	1.20%	27,064,000	233,000	79,000	58,000
	Controlled Emissions					
A	9,400	2.50%	25,381,000	60,000	122,000	1,000
B	10,000	1.20%	27,064,000	23,000	79,000	4,000
C	10,000		27,064,000	155,000	78,000	4,000
	Atmospheric Fluidized Bed Combustion					
A	10,000	1.10%	27,064,000	71,000	39,000	19,000
B	9,400	2.50%	25,381,000	60,000	49,000	4,000
	Integrated Gasification Combined Cycle					
A	10,000	0.45%	27,064,000	48,000	8,000	19,000
B	9,010		24,345,000	17,000	6,000	1,000
Gas	**Steam**					
A	10,400		14,762,000	0	34,000	0
B	9,224		12,820,000	0	80,000	4,000
	Combined Cycle					
1. Existing	9,000		12,820,000	0	49,000	0
2. NSPS*	9,000		12,820,000	0	23,000	0
3. BACT*	9,000		12,820,000	0	3,000	0
Oil	**Steam--#6 Oil**					
A	9,840	2.00%	21,366,000	324,000	38,000	36,000
B	10,400	2.20%	22,661,000	321,000	48,000	23,000
C	10,400	1.00%	22,661,000	46,000	39,000	12,000
D	10,400	0.50%	22,661,000	135,000	48,000	7,000
	Combustion Turbine					
#2 Diesel	13,600	0.30%	28,359,000	56,000	88,000	5,000
Refuse Derived Fuel						
Conventional	15,000	0.20%	33,668,000	87,000	114,000	25,000

Avoided Emissions Based on 11,772,131 kWh Saved (1985 - 1992)

In addition to the traditional costs and benefits there are several hidden environmental costs of electricity use that are incurred when one considers the whole system of electrical generation from the mine-mouth to the wall outlet. These costs, which to date have been considered externalities, are real and have profound long term effects and are borne by society as a whole. Some environmental costs are beginning to be factored into utility resource planning. Because energy efficiency programs present the opportunity for utilities to avoid environmental damages, environmental considerations can be considered a benefit in addition to the direct dollar savings to customers from reduced electricity use.

The environmental benefits of energy efficiency programs can include avoided pollution of the air, the land, and the water. Because of immediate concerns about urban air quality, acid deposition, and global warming, the first step in calculating the environmental benefit of a particular DSM program focuses on avoided air pollution. Within this domain we have limited our presentation to the emission of carbon dioxide, sulfur dioxide, nitrous oxides, and particulates. (Dollar values for environmental benefits are not presented given the variety of values currently being used in various states.)

HOW TO USE THE TABLE

1. The purpose of the previous page is to allow any user of this profile to apply the City of Austin's level of avoided emissions saved through its Energy Star Rating System to a particular situation. Simply move down the left-hand column to your marginal power plant type, and then read across the page to determine the values for avoided emissions that you will accrue should you implement this DSM program. Note that several generic power plants (labelled A, B, C,...) are presented which reflect differences in heat rate and fuel sulfur content.

2. All of the values for avoided emissions presented in both tables includes a 10% credit for DSM savings to reflect the avoided transmission and distribution losses associated with supply-side resources.

3. Various forms of power generation create specific pollutants. Coal-fired generation, for example, creates bottom ash (a solid waste issue) and methane, while garbage-burning plants release toxic airborne emissions including dioxin and furans and solid wastes which contain an array of heavy metals. We recommend that when calculating the environmental benefit for a particular program that credit is taken for the air pollutants listed below, plus air pollutants unique to a form of marginal generation, plus key land and water pollutants for a particular form of marginal power generation.

4. All the values presented represent approximations and were drawn largely from "The Environmental Costs of Electricity" (Ottinger et al, Oceana Publications, 1990). The coefficients used in the formulas that determine the values in the tables presented are drawn from a variety of government and independent sources.

AUSTIN AVOIDED EMISSIONS

Most of Austin's DSM programs, and the Energy Star program in particular, were developed in response to a city mandate that Austin meet its forecasted energy needs through DSM rather than construction of a new power plant. The original order envisioned that construction of a coal-fired plant would be prevented through DSM.[R#2] However, in recent documents, Austin has compared its DSM costs to construction of a gas-turbine power plant as the supply side option.[R#3]

Savings from Energy Star, along with those from Austin's numerous other DSM programs, have put the city of Austin in a position where it does not expect to need new capacity until the year 2002.

*** Acronyms used in the table**

TSP = Total Suspended Particulates
NSPS = New Source Performance Standards
BACT = Best Available Control Technology

LESSONS LEARNED

Extensive planning prior to project implementation has played a key role in the success of Energy Star. Goals, objectives, and specific means toward reaching them were defined early, and the project remained flexible to change as necessary to meet these goals.

Satisfaction of builders and home-buyers was recognized as key to success, and specific strategies were designed to foster cooperation and acceptance by both groups. Builder associations were involved in the development stage, insuring that their needs would be met by the program without undue burden. Currently, virtually all of the active local builders participate in Energy Star, demonstrating the success of the program in builder satisfaction.

Consumers have also been well represented in the evolution of Energy Star. An early marketing survey was valuable in identifying consumer needs. Over the years, Energy Star has realized that consumers will be happy if the program can provide them with two pieces of information: how a new home compares with others in energy efficiency, and how much money they will save.

Both builder and consumer viewpoints were considered in the program's switch from a manual checklist to the BETA computer program for generating ratings. The BETA computer program was introduced in the second year of Energy Star; with its implementation, ratings were completed more quickly, and valuable information could be returned to builders. Those builders who were interested in improving their ratings could then revise their plans for a new rating, without a large time delay. With the new BETA program, the primary basis for ratings was changed from energy-usage savings to energy-cost savings, however the point thresholds for awarding stars remained the same to avoid consumer confusion.

Development of the new Green Builder program has provided an opportunity for Austin to apply the lessons learned from Energy Star to a new program. Eventually, the components of Energy Star will be incorporated into Green Builder. The result will be a strong and comprehensive home rating system that brings together many environmental considerations and is propelled by consumer demand and builder acceptance.

TRANSFERABILITY

Several home energy rating programs exist or are currently under development across the U.S. The Energy Star program is exemplary among these, as demonstrated by the high participation rates and consumer acceptance.

Climate is a major factor in transferring a home energy rating system. Austin is a summer peaking utility, and the features that comprise an efficient home in Austin may not be desirable in a winter peaking area. The BETA program, which was designed specifically for Energy Star, is flexible and adjustable. The program can be altered to include new parameters or standards.

Energy Rated Homes of America, based in Little Rock, Arkansas, has developed the Uniform Energy Rating System, which is designed to be easily transferable regardless of location.[R#13] Additionally, a National Collaborative was formed "to develop a voluntary national program encouraging energy efficiency in homes through mortgage incentives linked to home energy ratings". The collaborative is comprised of a variety of members from across the United States; Mr. Seiter is a Technical Advisory Committee member.[R#14]

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Special thanks to Doug Seiter and Michael Myers for their guidance and assistance in the development of this profile