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# The City of Austin, Texas Green Builder Program

## Profile #121

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The Green Builder program is one of North America's leading energy services programs and stands as a powerful model for the future and as such was selected for inclusion in the Series 4 Profiles by The Results Center Board of Advisors. The Results Center salutes the City of Austin for its success with Green Builder; commends the City Council for supporting the program; and most especially congratulates the ESD staff for their dedication and their unquestionable success. In particular, we wish to recognize Doug Seiter, Green Builder's Program Manager.

This Profile is part of a collection of Profiles researched and published by The Results Center over the past four years. It is intended to provide a thorough understanding of the program and its unique elements. This Profile can also be used to compare this program with other programs documented by The Results Center. For a complete listing of the Profile Library see the Appendix. For additional information please contact The Results Center.

# Executive Summary

The City of Austin, Texas is home to one of the most progressive efficiency programs in the world. The Green Builder program pushes the envelope of energy efficiency program designs to encompass parallel emphases on water efficiency, waste management, and use of “green” building materials. Using a clever market-pull mechanism to foster an integrated resource management approach to new residential construction, Austin has not only begun to transform its own “shelter industry” but has been internationally acclaimed as a model for sustainable development.

Green Builder’s roots were in the Energy Star program, an early home energy rating program that was based on a point system (see Profile #11). The better the efficiency of the home, the better its rating, thus the more saleable the home. As community awareness in Energy Star grew the building community began to respond by “going green,” recognizing that efficiency had become a feature of home buyers’ decisions in Austin. When the program was expanded beyond energy efficiency, it “took off like a rocket!” Austin had tapped a vein of public interest and Green Builder quickly became prominent in Austin, the United States, and around the world.

As with other voluntary programs, effectively marketing the program to home buyers and to the shelter industry has been key to its success. The City has employed a range of strategies from renting a prominent billboard to hosting an acclaimed conference on green building. Collaborating with Habitat for Humanity and the American Institute for Learning (AIL) further raised the program’s profile. Along with the City, AIL was instrumental in developing a green building, job training program for at-risk youths. Then the greatest program leap occurred when a production home developer developed a large residential community in line with the program. Another developer further validated the program by building affordable housing to a Three Star rating, proving that green building can be socially responsible while affordable.

Perhaps Austin’s most important contribution has been its detailed assessment of building materials. To rate homes based on their materials, program staff not only had to get its arms around a vast and growing body of information related to green building, but also had to translate these values to the building community in Austin. The Sustainable Building Sourcebook represents a major effort in substantiating green building, providing builders, architects, developers, and others with comprehensive information on building materials and practices that can foster a path to sustainability. This arduous and pioneering work not only benefits Austin, but serves as a solid foundation for green building efforts around the world.

## THE CITY OF AUSTIN Green Builder Program

**Sector:** Residential new construction

**Measures:** Menu of sustainable building practices promoting an integrated resource management approach, covering energy, water, building materials, solid waste

**Mechanism:** Low-cost, market-pull program based on a One to Four Star rating system to raise awareness of and promote green building practices

**History:** Program design introduced in 1992; honored at Earth Summit in 1992; pilot in 1993; significant participation increase in 1994

### CUMULATIVE PROGRAM DATA

Electricity savings: 365 MWh

Gas savings: 3,585 CCF

Participation: 279 homes

Nominal program cost: \$920,181

Levelized program cost: \$813,975

### CONVENTIONS

All Series 4 Profiles will report nominal dollar values except where expressly stated as levelized. Levelized figures, used for comparative purposes, are based on 1990 U.S. dollars. Inflation and exchange rates were derived from the U.S. Department of Labor’s Consumer Price Index and the U.S. Federal Reserve’s foreign exchange rates.

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.

# Program Manager's Perspective

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**BY DOUG SEITER**

**“People in the 11th, 12th, and 13th Centuries felt that they were engaged in what they called a Great Work, the establishment of a finer civilization after the chaos of the Dark Ages. There is a Great Work for us to do too, and as we do it, it will not only give us a better world,... it will give us a reason to live.”**

**Thomas Berry**

Like our ancestors, we continue to strive for a finer civilization, an enlightened society. Since the Earth's population challenges our sustainability and future existence, carefully nurturing and managing the Earth's bounty of resources provides us with a means for sustainability and concurrently a path to a higher quality of life.

This could not be more relevant to building practices. In a world where we have virtually unlimited building resources, we have chosen to build with materials and practices that squander precious and finite, non-renewable resources. Furthermore, we have done so in excess, building massive homes without regard for their direct and indirect impacts on the environment.

The Green Builder Program isn't going to single-handedly alter the culture. It is, however, an attempt to put key information in the hands of the mainstream building industry with the belief that people will make the choices that have the best chance of improving the quality of their lives. This, in turn, will drive a change in the industry that will create and sustain a healthy, viable community. Choices abound, and many are available, quality choices from building design to materials to lifestyle. Passive solar design can be easily incorporated into conventional home plans; “engineered” wood products save wood resources; mass transit and telecommuting save energy and keep cars off the streets at rush hour.

The Green Builder Program is off to a good start but the work ahead is daunting. The momentum of daily practice is not easy to sway. Green building is in competition with “not-so-green” and “downright-dirty” building. We have to acknowledge the “realities” of the business decisions that builders, often small business owners, have to make. Most of these “realities” come down to cost, but may also be time and convenience (also

related to cost), and buyer preference. And as “greener” alternatives emerge they are still subject to the influences of manufacturing, availability and development costs to name a few. Getting information to the public and the building professionals will help, but green building will take the combined efforts of all players, including the buyers. The Green Builder Program can help here.

Buyers will drive the shift to green building to the extent that they perceive the difference between “cost” and “value.” Cost is easy. Value gets a little tricky. What is the value of choosing local products over those from other states or countries? What is the value of tile floors and thermal mass over builder-grade carpet? What is the value of choosing a domestic hardwood over exotic rain forest lumber? The answers to the first two questions actually can and should be quantified in economic terms related to operating costs, durability, and local economic activity. The answer to the third question is more elusive as it involves raising awareness and changing values. This, frankly, is going to take more than a brochure from the Green Builder program.

Green Builder has had a remarkable few years. Since its introduction in 1992, through the efforts of a tremendously motivated team, the program has begun to influence a broad range of building and development activities not only in Austin but literally around the world. There is little doubt that our timing was excellent; we pulled together the work of individuals who have been deeply involved in “sustainability” research for decades before the term “green building” hit the media. But if we are leaders in green building, it is because many before us had prepared the way and the public was ready for the message. Sustainability, in its essence, makes sense. A sustainable community encompasses a healthy economy and a healthy environment, and the interrelated elements of a sustainable community touch the heart of the critical issues of our day, from crime to health care.

At this writing, fully 133 local and regional building-related companies have become members of the Green Builder program. It is a network of information sharing and dialogue to help shift the building industry, an industry which has such a tremendous impact on every aspect of our lives, toward practices which improve and sustain a quality of life for which our children will thank us. This work has often reminded me of a saying (by whom I cannot recall): “Human beings will always do the right thing,... after exhausting all other options.”

# Program Context

## AUSTIN ELECTRIC UTILITY OVERVIEW

Austin is the capitol of Texas and home to 507,468 people who have the distinction of being the most educated citizenry of any large U.S. city. Austin residents are also recognized for their progressive views and awareness and appreciation of culture, music, and environmental issues. With an appealing quality of life, a job growth rate of 6%, and an average temperature of 67.5 degrees Fahrenheit, it's not surprising that Austin experienced a strong growth spurt in the early part of this decade and is continuing to grow. [R#3]

Austin's own municipal electric utility has been serving electricity in the City since 1839. In 1994 the Electric Utility Department served 298,785 customers. In the same year the City experienced a peak demand of 1,611 MW and sold 7,535 GWh of electricity, representing sales revenues of \$495.6 million. Average electric rates for Austin in 1994 were a slightly less than the national average with 7.11¢/kWh for residential, 6.68¢/kWh for commercial, and 5.17¢/kWh for industrial. The utility's primary resource for electricity is coal which accounts for 54% of the total resource mix. One-fourth of the power supply is derived from the City's 400 MW share of the South Texas Nuclear Project, with 17% generated with natural gas. The municipal utility also has a small photovoltaic installation at one of its gas-fired plants which contributes 300 kW to the City's generating capacity. With a total capacity of 2,420 MW the Electric Utility Department had a reserve margin of 50% in 1994. [R#3]

Given its large reserve margin the City has been able to respond to citizen pressures and has moved towards shutting down one of its power plants which has been operating in an undesirable urban location. In response to long-held citizen concerns which culminated in a virtual outpouring of complaints, on January 19, 1995 the Austin City Council passed a resolution adopting a decommissioning schedule for the 540 MW Holly Street Power Plant. Under the resolution, two of its four generating units will be retired in late 1998 with the remaining units to be retired by the year 2005. This schedule will allow adequate time to complete necessary transmission up-

## AUSTIN 1994 STATISTICS

<i>Number of Customers</i>	298,785
<i>Electric Revenues</i>	\$495.6 million
<i>Energy Sales</i>	7,535 GWh
<i>Peak Demand</i>	1,611 MW
<i>Generating Capacity</i>	2,420 MW
<i>Reserve Margin</i>	50 %
<b><u>Average Electric Rates</u></b>	
<i>Residential</i>	7.11 ¢/kWh
<i>Commercial</i>	6.68 ¢/kWh
<i>Industrial</i>	5.17 ¢/kWh
<i>Government</i>	5.87 ¢/kWh

grades and to build 300 MW of replacement capacity. This capacity will provide the reserve necessary in the event of failure or unlikely sale of the nuclear plant. With the scheduled retirement dates, all generating units will be used for their full 30-year lifespans. [R#3]

The South Texas Nuclear Project (STP) has played a crucial role in the current complexion of Austin's electric use and balance. Against popular citizen opinion Austin became a 16% owner of STP in 1973. By 1981 the nuclear project had run into snags and the City began efforts to sell its share. It concurrently filed a lawsuit against the plant's engineering firm for substandard work. The City won its suit and was awarded a \$120 million settlement in 1985 which has been partially used to develop efficiency initiatives in Austin. Meanwhile the City has continued unsuccessfully to sell its holdings in STP. [R#17]

## ENERGY SERVICES OVERVIEW

Ironically, Austin's nuclear experience was an early catalyst for energy efficiency. Controversy surrounding STP fueled the

<b>AUSTIN DSM OVERVIEW</b>	<b>ANNUAL ENERGY SAVINGS (GWh)</b>	<b>ANNUAL CAPACITY SAVINGS (MW)</b>	<b>ANNUAL DSM EXPENDITURE</b>	<b>ANNUAL DSM EXPENDITURE (Levelized)</b>
<b>1989</b>	16.2	12.00	\$7,616,876	\$8,028,433
<b>1990</b>	44.1	27.29	\$8,770,310	\$8,770,310
<b>1991</b>	46.5	26.63	\$8,088,972	\$7,748,579
<b>1992</b>	31.1	19.12	\$8,740,873	\$8,120,995
<b>1993</b>	37.1	23.05	\$9,432,438	\$8,501,173
<b>1994</b>	59.2	33.60	\$11,109,000	\$9,755,840
<b>Total</b>	175.0	108.09	\$53,758,469	\$50,925,331

public's interest in energy use and supported the prospect of alleviating the City's increasing need for energy. This awareness sparked the City's highly progressive "Conservation Power Plant" plan in 1983. Then the focus and awareness of energy efficiency was turned into a reality when the City received the multi-million settlement from the STP suit. Half of the awarded amount was slated for energy efficiency and was used to form the City's Environmental and Conservation Services Department (ECSD).

Within the ECSD, the Energy Services Division (ESD) was created with the specific mission of providing the City with demand-side management services. (See Profile #95: City of Austin Comprehensive DSM.) Thus unlike many municipal utilities whose energy management groups are internal, in Austin energy services are provided by the ESD quite separately from the City's electric utility, a sister agency. (ESD also provides gas DSM services for the investor-owned utility that serves Austin, see Profile #94.) Since 1991, the Electric Utility Department and the ECSD have collaborated in integrated resource planning. This innovative structure had proven successful for Austin, gaining recognition from Financial World magazine which ranked Austin the fifth best-managed city in America and earning it the Clean Texas 2000 Governor's Award for Environmental Excellence.[R#3,17]

In 1992 the remainder of the funds earmarked for energy efficiency were reallocated to buy-down the utility's bond debt. Since that time the City's electric utility has provided funding for DSM using a conventional rate base mechanism. In 1994, total budget for energy efficiency was \$11.109 million, just over 2% of the total sales revenue for the year. Austin's electric DSM programs were very successful in 1994, producing savings of 59.2 GWh and capacity savings of 33.6 MW.[R#3]

Austin, like many other cities, continues to grapple with the philosophical issue of whether or not to privatize its utility. While the utility has been unusually effective under its present structure, the free-market ideology of privatization still exists. If and when Austin decides to sell its electric utility, it is likely that its energy efficiency counterpart, ECSD, will change its structure. Interests in streamlining the City government and achieving "personnel efficiency," however, have suggested the consolidation of several agencies. It is possible that such a reorganization of City agencies and tasks could combine the ESD and the electric utility, potentially threatening the clear focus of the ESD to serve the public with resource efficiency and the long-term interest.

# Program Design and Delivery

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Throughout the country the construction of new homes continues to proliferate at a staggering pace. In 1994 a total of 1,457,000 new privately owned homes were built in America, a 13.2% increase above the previous year. Austin experienced a jump in its building activity in 1991 and 1992 and since then has maintained a production rate of 7,250 new homes a year providing a rich opportunity to “do it right” the first time, incorporating resource efficiency into new home construction.

As construction levels have climbed so have concerns about the environmental impacts associated with home building, as has awareness of “lost opportunities.” Homes that are built today without efficiency measures become locked into excessive consumption patterns and therefore forego opportunities to save energy and other resources. Building and design professionals, government agencies, and consumers are all becoming more educated about building environmentally friendly homes and sustainability in general. Issues relating to sustainable building such as energy and water efficiency, lifecycle analysis of building materials, improved design elements, use of nontoxic materials, and a strengthened sense of community are slowly working their way into the construction industry. The movement towards sustainable building practices is at the heart of Austin’s Green Builder program.

## **PROGRAM CONCEPT AND PHILOSOPHY**

Austin’s goal to become a sustainable community is predicated in a philosophy that it has to plan its future, that it can indeed chart its own destiny. The concept of combating sprawl by encouraging remodeling before new construction, reducing building size with better designs, developing in areas which already are serviced with electricity and water, and notion of planning communities to support the way we live our lives are the ideals Austin uses to develop healthy communities.

Addressing sustainable development of new homes, the Green Builder program promotes conservation for four areas of resource use - energy, water, building materials, and solid waste. Green Builder’s Program Manager Doug Seiter states that the program’s goal is to accelerate the integration of sustainable building practices into mainstream building through marketing and education. Typically, the building industry is slow to incorporate new trends and influences into its production. The general rule of thumb is that it takes 19 years for a new development to become an established practice of the building industry. Concerns that the need to convert present development habits to a sustainable level at a more urgent pace than this timeline suggests inspired the Green Builder program and other such programs across the country.[R#6]

Conceptually, Green Builder looks at the house as an integrated system where different parts of the house have an influence on the other parts. With Green Builder, the City has an opportunity to promote the ecological concept that nothing which is done happens in isolation. The program considers the following aspects of sustainability: conserving natural resources, preserving health of the environment, strengthening the local economy, and improving the quality of life for Austin.[R#4]

Fundamentally, Green Builder is a marketing program and not one that relies on incentives. The program is based on a market-pull mechanism whereby the City promotes green building practices, rates homes that feature these practices, thus creating more attractive products for builders to build and home owners to buy. While the Green Builder program offers no direct incentives, most participating builders take advantage of rebates available through other DSM programs such as the Appliance Efficiency Rebate Program or the Xeriscaping rebate. (Green Builder is currently experimenting with a limited \$200 rebate for radiant barrier systems to see its effect on participation and budget.)

Builders that comply with the program’s guidelines and requirements can market their homes as Green Builder homes. To assist compliance and to drive the program, ESD had to develop a guide for green building practices. ESD also had to promote the Green Builder identity among the entire shelter industry. By effectively doing so, the City was able to pull the market toward green building, expanding the building community’s acceptance of energy efficiency and broadening the program to encompass water use, building materials, and waste management. Like Energy Star, rated homes receive a certificate which prominently displays the home’s rating.

## **PROGRAM DESIGN**

The Green Builder program operates on a voluntary basis using market forces to promote sustainable building practices. Driving the market towards environmentally friendly building has increased the marketability of Green Builder homes, a compelling benefit which the program offers to area developers. Applying this sort of positive influence on the building community, instead of imposing regulations, has effectively solicited the cooperation and interest of area professionals.

Strategically, Green Builder considers four areas where resources are used and can be conserved: energy, water, building materials and solid waste. The program encourages a more sustainable approach to each of these resources by promoting

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a list of measures and design features for the construction of new “Green Builder” homes. By implementing specified items on the list for each category builders can earn Green Builder ratings of One to Four Stars. These ratings, in turn, boost the salability of Green Builder homes, effectively pulling the market towards sustainable building which is the central thrust of the program.

A testimony to the strength and vision of the program’s design, the Green Builder program was honored at the 1992 Rio Earth Summit, the only U.S. program out of twelve awarded by the United Nations Local Government Initiatives Honours Programme. As the nation’s first sustainable rating system for homes, the Green Builder program serves as a model for building around the country and the world.

## **PROGRAM HISTORY**

### **THE ENERGY STAR EXPERIENCE**

The Green Builder program was born out of Austin’s Energy Star Rating program. (See Profile #11) Energy Star was launched in 1985 and encouraged the construction of energy-efficient homes through a rating system. Austin was among the pioneers of residential energy rating systems which have now become quite popular (See Profile #90: Energy Rated Homes of America; Uniform Energy Rating System). Energy Star rated homes earned points for energy-efficient measures which were selected from the program’s building guide and included in the building’s design. Homes were awarded a rating of One to Three Stars depending on the total number of points. Energy Star enjoyed strong participation with approximately 75% of all eligible new homes built between 1986 and 1992 receiving an Energy Star rating. In terms of penetration, average energy savings per home grew from 662 kWh/yr in 1986 to 1,248 kWh/yr in 1992.

Much of the groundwork for Green Builder was laid by the Energy Star program. By choosing a design which relied on market forces to promote efficiency measures voluntarily, instead of regulations, the program received a positive response from the building community. Energy Star successfully put a home rating system in place and gained familiarity with area professionals, paving the way for subsequent initiatives.

### **ADDING RESOURCE COMPONENTS**

Energy Star also gave ESD a presence in Austin’s homes and the feedback that pushed the Division to expand the program to encompass other resources. Through Energy Star the Divi-

sion was already visiting homes to promote the installation of electricity and gas-saving measures, why not install water-efficient fixtures as well? Mike Myers, former Manager of the Energy Services Division, noted that agency staff members had already become valuable resources for customers who wanted more information on everything from saving energy and water to recycling. This exposure to the customers and their homes prompted Myers and his colleagues to consider how to expand the program and to ask of themselves, “Why can’t we do something better?” [R#2]

The desire to tap the synergy between installation of resource-efficient measures prompted some brainstorming on how to expand the early rating system to areas beyond energy. The process of expanding the program began with the availability of a grant from the U.S. Department of Energy (DOE) and Public Technology, Inc.’s (PTI) Urban Consortium Energy Task Force (UCETF), an organization of the nation’s most progressive city governments which Austin joined in 1989. Austin submitted a proposal to the UCETF to develop a green building rating for new homes and received the first of three grants in 1989 for a sum of \$75,000 to research and design the first-cut green builder rating system. [R#1,6]

### **GREEN BUILDING GUIDE**

To develop a green builder rating system, input from various sources in the area were solicited. The Texas Capital Area Builders Association was engaged during the development of the rating system. The City also contracted The Center For Maximum Potential Building Systems (CMPBS) for research and consultation. Drawing heavily from the research conducted by Pliny Fisk III and CMPBS, ESD produced its first Sustainable Systems Rating. The system looked at the four identified areas of resource use and considered such things as the lifecycle of particular materials, design strategies, and sustainable practices. The end result was a Green Builder Guide which presented the mission of the program and a mainstream application for a rating system for sustainable building. It provided guidelines for area building professionals that were interested in becoming members and participating in the program [R#1,2,12]

The Green Building Guide was comprised of 134 items for sustainable building practices broken out into four categories as follows: 38 options for energy efficiency, including Energy Star points; 16 options for water efficiency; 70 options for sustainable building materials; and 10 options for managing solid waste. Each of these options was assigned a point value. Builders earned points by including a variety of eligible measures in

## Program Design and Delivery (continued)

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new buildings. By totaling the points by category the builder was assigned a sustainability score for that category. The total of these scores for each of the four categories determined the overall Green Building rating of One, Two, Three, or Four Stars. The overall rating reflects the lowest rating from the four categories.[R#10]

### **SUSTAINABLE BUILDING SOURCEBOOK**

While the Green Building Guide was a workable rating methodology it did not provide the level of information for the building community which was needed to transform building practices. Thus the second phase of the program development was to produce a marketable information packet which would be used as a reference for builders and an educational tool for the public. To support this initiative Austin received a second UCETF grant in 1990 for \$40,000 to develop the Sustainable Building Sourcebook. This grant also supported the additional staff required to complete the project, including Laurence Dosey who became the author of the Sourcebook.[R#1,5]

What ensued was a monumental piece of work and the key to the foundation of the Green Builder program. The Sustainable Building Sourcebook is a 450-page reference that covers in detail the 134 sustainable building practices listed in the Green Builder Guide. The reference is bound in a three-ring binder with pages numbered in a fashion which allows for updating in regard to regulations, engineering innovations, resource availability, etc. Members of the program, a feature discussed below, receive updated pages to the Sourcebook as information changes.[R#5,6]

The Sourcebook is organized by the four resource categories beginning with a list of the Green Builder measures for that resource. The technical application of those measures are discussed by section for the builder's reference. Each application section includes the specific information the builder will need to include any of the Green Builder options in his project. For example, the Construction Specification Institute (CSI) reference numbers are listed for cross-referencing with construction manuals. The Sourcebook also provides definitions for all relevant terms and presents pertinent considerations for each option. A rating of the commercial status and implementation issues on a scale of satisfactory to difficult gives the builder quick reference on the relative ease or difficulty of such concerns as technology, suppliers, costs, financing, public acceptance, and regulatory issues. Guidelines for implementation of all measures are also included. Finally, references pertaining to professional assistance, materials and systems, and general information are listed at the end of each section.

Even though the Sourcebook was developed by Austin's ESD as a supplement to its Green Builder program, and addresses regional specifics regarding climate and area professionals and resources, much of the information outlined in it has global application. With its sponsorship from the UCETF, a national organization, it was the intent that the Sourcebook reach beyond the Austin area. As such much of the information contained is readily transferable. Examples of universal options include energy and water-efficient appliances and fixtures, recycling centers, and engineered materials. Even those region-specific options such as planting native Buffalo Grass (a drought-tolerant grass species) indicate ways in which a specific region should be analyzed for its resources. Complementing the transferable concept of the Sourcebook is the UCETF's report on the Sourcebook project, a valuable guide for others interested in catalyzing other Green Builder programs.

### **THE EVOLUTION OF GREEN BUILDER**

One of the unforeseen aspects of the Green Builder program is how quickly its most important intent, transforming the building community and practices, surpassed the basic mechanisms that its program designers saw as steps to program success. Specifically, the rating system itself – which had been expected to serve as the core of the program – has in reality become a secondary tool. Doug Seiter reports that the program's real success can be measured by the fact that ESD has become a highly utilized resource for the building community. This is particularly true for custom builders who do not need to earn ratings for marketing purposes, but who instead want to learn more about building options available to them. (This is less true for speculation and production builders who have not secured buyers for their properties and who are thus quite keen about using positive Green Builder ratings as sales tools.) For both parties, the Green Builder program staff have become valued information resources.[R#1]

To demonstrate the merit and applicability of the program, a third grant was issued from the UCETF in 1991 for one of the Green Builder's first projects, the Green Habitat Learning Project featured on page 15. This effort came to fruition thanks to collaboration with Habitat for Humanity, one of the region's largest builders, and the American Institute for Learning, an organization which works with at-risk youth to help them develop trade skills. The Green Habitat Learning Project has served as a showcase for the program and had strong community appeal, not only for its sustainable building achievements but also because it was a City-sponsored program which provided low-income green housing and benefitted local troubled youths with employment opportunities.[R#1]

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**NUMBER OF GREEN BUILDER  
REGISTERED MEMBERS IN 1994**

<b>Builders</b>	41
<b>Additional Resources</b>	36
<b>Architects/Designers</b>	6
<b>Financial/Mortgage Lenders</b>	3
<b>Engineering Services</b>	2
<b>Developers/Com'l Contractors</b>	2
<b>Heating &amp; Cooling Systems</b>	1
<b>Household, Ecological Products</b>	1
<b>Indoor Air Quality</b>	1
<b>Landscaping/Urban Forests</b>	1
<b>Water Systems</b>	1
<b>Total</b>	95

### **GREEN BUILDER MEMBERS**

Green Builder provides technical, logistical, and marketing assistance for building professionals including builders, architects, engineers, and other trade allies who offer green building services and promote the program. Like the U.S. EPA's highly successful Green Lights program participants, Green Builder registers professionals as Members of the Green Builder program. This not only elevates the importance of the program but serves as a means of assuring that building professionals are educated to a base level of expertise to participate in the program.

Austin's building industry professionals are solicited to become registered Green Builder Members. To become registered through the program, builders, architects, engineers and anyone else associated with development in Austin must attend a brief enrollment seminar and at least one technical seminar each year. Seminars are offered periodically throughout the year with a frequency of one every other month. Each member also receives a copy of the Sustainable Building Sourcebook. [R#6]

### **GREEN BUILDER DIRECTORY**

The program is also supported by a Green Builder Directory which is available from the City as an additional tool for area builders. The directory gives a complete listing of Green Builder Members according to professional category such as builder, architect, financial resource, building product supplier,

engineer, or heating and cooling specialist. Listings include notations for special services provided such as straw bale construction and grey water systems.

### **TECHNICAL STAFF SUPPORT**

ESD staff are available to provide technical and design assistance to program members and have been heavily relied upon by area professionals. Home buyers and builders are encouraged to look at the requirements for all rating levels of the program and ask questions of their designers and builders. If they do not have answers, the Green Builder Customer Service hotline is available to provide information and assistance.

### **THE HOME RATING**

The home rating process originally was based on a point structure for determining the building's rating from One to Four Stars. Each of the 134 Green Builder measures was assigned a point value. A builder would total the points earned for each option included in a new home to determine its overall rating. This system, however, was perceived as a hindrance to participation as the application process was burdensome and the design required the builder to calculate which options to include in order to earn a certain rating.

In 1993, to simplify the rating process, the program's measures were reorganized into packages containing options from each of the four categories. These packages provide a menu of measures which need to be installed in order to earn a particular rating. This menu approach requires no calculating or perusal of the 134 item list. Concurrently, the application was streamlined to a four-page format and program participation greatly simplified. [R#1]

The building options were assigned to the various rating levels based on their costs, availability, and other relevant concerns. For example, a One Star rating includes measures which are most basic, least cost, require little engineering, and are easily available. As the ratings progress to the Two, Three, and Four Star levels, so do the degree of cost and difficulty of the measures. Of course, the greater the rating, the "greener" the home and the lower its resource consumption and thus utility bills.

While the resource-efficiency measures were bundled into four basic options to ease participation, the City does remain willing to customize the program where necessary and to negotiate substitutions for any option on the menu. For example, the Meadows at Walnut Creek subdivision will consist of 94 Three Star homes, some of which will trade out certain design

# Program Design and Delivery (continued)

<b>ONE STAR RATING ★</b>	
<b>Energy</b>	<ul style="list-style-type: none"> <li>■ Ceiling fans</li> <li>■ Minimum of 30 Energy Star points</li> <li>■ 12.0 SEER efficiency rating on air conditioner sizing by "Manual J" calculations</li> <li>■ Minimum of 600 sq. ft./ton of air conditioning</li> <li>■ Ducts installed according to "MAD AIR" specifications</li> </ul>
<b>Water</b>	<ul style="list-style-type: none"> <li>■ Plant Buffalo or Bermuda Grass</li> </ul>
<b>Building Materials</b>	<ul style="list-style-type: none"> <li>■ 1 "recycled-content" space material</li> <li>■ 2 "engineered" materials</li> <li>■ Waste-saving concrete (&gt; 15% flyash)</li> <li>■ No ozone-depleting insulation or sheathing (no CFC or HFC foam products)</li> <li>■ Interior painted with low-VOC products</li> </ul>
<b>Solid Wastes</b>	<ul style="list-style-type: none"> <li>■ Include a recycling center in the kitchen, garage, or utility room</li> </ul>

<b>TWO STAR RATING ★★</b>	
<b>Energy</b>	<ul style="list-style-type: none"> <li>■ All One Star requirements</li> <li>■ A third ceiling fan</li> <li>■ Minimum of 20 more Energy Star points</li> <li>■ Radiant barrier and continuous ridge and soffit vents</li> <li>■ Efficient water heater (0.60 Energy Factor)</li> <li>■ Shade east &amp; west walls (trees, bldgs)</li> </ul>
<b>Water</b>	<ul style="list-style-type: none"> <li>■ All One Star requirements</li> <li>■ Xeriscape at least 75% of maintained landscape</li> </ul>
<b>Building Materials</b>	<ul style="list-style-type: none"> <li>■ All One Star requirements</li> <li>■ A second "recycled-content" material</li> <li>■ Cabinets sealed inside and out with water-based sealer or made out of solid wood or metal</li> </ul>
<b>Solid Wastes</b>	<ul style="list-style-type: none"> <li>■ All One Star requirements</li> <li>■ Composting system (made at the site or off the shelf)</li> </ul>

nated Three Star options for the addition of solar panels, a Four Star option. This flexibility effectively addresses any barriers that a particular option on a menu might have posed in terms of cost and design preference.

## MEASURES INSTALLED

The structure of the Green Builder program is based on four areas of resource conservation. By determining the underlying building principles for sustainability for each of these resources, and the specific uses and sources of each in the context to Austin's building environment, a list of measures for conserving each of these resources was formulated. These lists make up the building options promoted by the program.

### 1. ENERGY

The City of Austin has addressed energy use in homes in a number of ways. In 1985 it developed an Energy Code; Energy Star pushed building practices beyond the Code. Then in the early 1990s the City banned electric resistance heating for new homes. Austin builders readily accept this restriction as the

area enjoys one of the nation's lowest natural gas rates. Thus new residences are generally built with natural gas heating although about 20% of the new homes are built with electric heat pumps and there is also some minimal propane heating. Austin's hot and humid summers, however, place heavy demands on air conditioning loads.

Program researchers had a head start in this category with the Energy Star program and its roster of suggested measures in place. Green Builder added measures to the list. For instance, additional consideration was given to design strategies, as well as for the application of renewables and advanced technologies such as high efficiency appliances and fixtures. This brought forth such building options as ceiling fans, revised standards for minimum floor space per tonnage of air conditioning, and shading of the east and west walls with trees. These measures tend not only to save electricity but increase occupant comfort as well.

The program's impact on energy efficiency received its biggest boost from the new technology brought forth by "MAD AIR"

<b>THREE STAR RATING</b> ★★★	
<b>Energy</b>	<ul style="list-style-type: none"> <li>■ All Two Star requirements</li> <li>■ Ceiling fans in all main rooms</li> <li>■ Minimum of 20 more Energy Star points (total of 70)</li> <li>■ Minimum of 800 sq. ft. of living space/ton of AC, or install minimum 14.0 SEER</li> <li>■ Solar energy (passive or active) for either 40% of hot water, 10% of electricity, or 15% of space heating (may substitute earth-sheltering)</li> <li>■ Reduce health risks from electromagnetic fields</li> </ul>
<b>Water</b>	<ul style="list-style-type: none"> <li>■ All Two Star requirements</li> <li>■ A water budget (estimate of indoor and outdoor water use)</li> </ul>
<b>Building Materials</b>	<ul style="list-style-type: none"> <li>■ All Two Star requirements</li> <li>■ Third "recycled-content" material</li> <li>■ Third "engineered" material</li> <li>■ One regional material</li> <li>■ Wood from "certified" sustainable forests only</li> <li>■ Low-VOC products on exterior</li> <li>■ Water-based glues</li> <li>■ No fiberglass in HVAC air stream</li> </ul>
<b>Solid Wastes</b>	<ul style="list-style-type: none"> <li>■ All Two Star requirements</li> <li>■ Make use of the trees cut at the site (for mulch, fence posts, etc.)</li> </ul>

<b>FOUR STAR RATING</b>	
<b>Energy</b>	<ul style="list-style-type: none"> <li>■ All Three Star requirements</li> <li>■ Minimum of 10 more Energy Star points (total of 80)</li> <li>■ Minimum of 1,000 sq. ft. of living space/ton of AC, or install minimum 14.0 SEER</li> <li>■ A water heater which provides space heat, minimum of 0.60 Energy Factor and 80% recovery efficiency</li> </ul>
<b>Water</b>	<ul style="list-style-type: none"> <li>■ All Three Star requirements</li> <li>■ Collect rainwater from roof for irrigating landscape, or irrigate with a waste/grey water system</li> </ul>
<b>Building Materials</b>	<ul style="list-style-type: none"> <li>■ All Three Star requirements</li> <li>■ A fourth "recycled-content" material</li> <li>■ A fourth "engineered" material</li> <li>■ Non-toxic termite protection</li> </ul>
<b>Solid Wastes</b>	<ul style="list-style-type: none"> <li>■ All Three Star requirements</li> <li>■ Plan for the reduction or reuse of construction waste</li> <li>■ Ventilated, lockable cabinet for storage of hazardous home products (e.g., paints and pesticides)</li> </ul>

(Mechanical Air Distribution And InterRelationships). MAD AIR specifies the duct design and sealing necessary to eliminate leaks which can account for system losses of up to 40% and which can also introduce health hazards such as dust and flue gases into the system. Green Builder's emphasis on properly functioning duct systems turned out to be so important that this conservation/safety measure has since been added to Austin's building code, another exciting program effect. [R#4]

**2. WATER**

Austin uses an average of 94 million gallons of water every day making the water and wastewater system the City's largest

energy consumer. The average household uses 120,000 gallons of water annually. For new homes the average is 100,000 while a Green Builder home's water consumption can be as low as 36,000. Put in another perspective, Austin residents discard an average 45,000 gallons of grey water every year; more than is needed for the most efficient Green Builder home. [R#4]

Green Builder's water efficiency practices span across both exterior and interior applications. For instance, the program emphasizes landscaping to control run-off and minimize the need for irrigating; xeriscaping (landscaping with indigenous and drought-tolerant plants such as Buffalo Grass); water efficient appliances and fixtures; and grey water and rain water collection systems. The program also encourages home owners to calculate a water budget to make occupants acutely aware of how much water they use. Program designers also offer the reminder that saving water – especially hot water – also saves energy. [R#4]

# Program Design and Delivery (continued)

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### 3. BUILDING MATERIALS

To build a typical 1,700 square foot wood-frame or “stick-built” home requires the clear cutting of an acre of forest. If every house built in Austin in a single year were wood framed, fully 15 square miles of forest would be consumed annually. And when building materials are harvested from remote locations there is the additional transport impact to be considered.

The program takes a cradle-to-grave approach when considering the direct and indirect impact of building materials including where and how they are harvested or produced, the amount of energy involved in that process, their durability and how they can be recycled and/or ultimately discarded. Thus local building supplies are promoted. These include earthen products such as brick, Yellow Southern Pine for framing, and Mesquite and Pecan for flooring and trim.

The program is also intended to support the local and State economy. In what some may consider an unusual program design, plastics are promoted through Green Builder for bath fixtures and other applications since 90% of the nation’s plastics are produced in Texas. This program design feature supports the use of regional products as an aspect of sustainability.

The Green Builder program also explicitly recognizes the impact of home construction waste. Construction sites tend to be massive waste generators supported by oversized dumpsters and low disposal fees. Thus builders get credit for proper construction waste management.

Looking further downstream, Green Builder also considers and factors in the health impacts of building materials on future occupants as studies show that U.S. citizens spend 80-90% of their time indoors. Materials’ potential health effects are especially important since more energy-efficient homes are tighter and thus trap more fumes. Green Builder encourages the use of non-toxic, natural materials. These types of holistic considerations are among the program’s most attractive and forward-thinking features.[R#4]

### 4. SOLID WASTE

Every American generates an average of 6.2 pounds of waste every day, about double the amount of garbage produced per person in Western Europe and Japan. Recycling not only reduces this volume but cuts down on energy consumption and pollution as well. In 1992, 24% of Austin’s residential and commercial sectors’ waste was recycled. This figure has nearly doubled for the residential sector for 1995.[R#4]

Following the edict “reduce, reuse, recycle,” the Green Builder program encourages both recycling and “pre-cycling.” Pre-cycling takes into account reducing waste generation in the first place, for instance, buying materials with minimal or recycled packaging. This orientation is important for materials used both for construction of the home and in and around the home once it is built.

Solid waste management design features promoted by the program include inclusion of recycling centers in homes, the use of standard-sized materials, and creating secure storage spaces for hazardous materials. Composting – part of a Two Star home’s requirements – is also encouraged through the program and has been incorporated into the designs of more than 30% of Green Builder homes.[R#4]

## MARKETING

### GREEN BUILDER’S MARKET-PULL MECHANISM

Key to the design and success of Green Builder is the program’s use of market forces to achieve its goal of converting Austin’s building industry to sustainability. Creating a green building market has been the program’s greatest challenge and fundamental to its success.

ESD successfully broke the market barriers by establishing an awareness of the Green Builder program within the building community and targeting the volume builders. Harry Savio of the Texas Capital Area Builders Association (TCABA) believes that awareness of the Green Builder program is close to 100% in the building community. He estimates that half of Austin’s custom builders participate in the program and that three of the area’s ten volume builders are working with Green Builder. In fact, as organizers for the upcoming Parade of Homes, TCABA is trying to make it a 100% Green Builder event.

Clearly the program concept is at least partially institutionalized in Austin. Doug Seiter reports that the program “took off like a rocket,” as if it was fulfilling some sort of pent-up demand for greener building. Other evidence of progress towards green building involves the inclusion of photovoltaic (PV) panels in the Meadows at Walnut Creek subdivision, improving the design of Austin’s new airport, and working with architects, planners, builders, developers to integrate standards into municipal guidelines.[R#1,12]

Beyond the construction of individual “green” homes, the Green Builder program has succeeded in creating a market for green products and services. A strong example is in the avail-

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ability of low-VOC (Volatile Organic Compounds) paints for improved indoor air quality. At the onset of Green Builder there was only one low-VOC product on market: Glidden 2000 paint. Now, Benjamin Moore and others produce low- and no-VOC paints and product availability has increased in area stores in response in part to Austin's Green Builder program. Green Builder has improved the market for other alternative building materials as well. Products that can substitute for sheetrock are becoming common in Austin. For instance, "Faswall," a mineralized wood fiber from waste wood, and "Stramit," a product manufactured with compressed straw and recycled paper, are now supplied by local building suppliers. Likewise, businesses delivering green building services such as rain water harvesting and straw bale construction have cropped up and grown. The economic development which has resulted from the program also contributes to the program's goal of sustainability.[R#1]

## **MARKETING THE PROGRAM**

Program staff firmly believe that getting the word out to both area professionals and the public has been as much of a program emphasis as has been developing the optimal program design. Mike Myers recognized that in order to achieve this success a market had to be created through both outreach and training. To do so a number of techniques were used including advertising, getting coverage in local papers, demonstration projects, and sponsoring a Green Building Conference as well as frequent seminars.

Identifying the need for outreach and training inspired Green Builder staff to participate in the 1992 Central Texas Builder's Conference by adding a "green component" to the event. Strong attendance for the "green seminars" and at booths prompted a special Green Builders conference in 1993 which included seminars, workshops, and tours of outstanding green buildings in the area. The conference was attended by building professionals and the general public.[R#2]

The annual Green Builders conference has become a major function in Austin for the expanding green building community and for program staff. It is an important means of heightening public awareness and soliciting the building community for memberships. The 1995 conference marked ESD's fourth such event with over 75 vendors and 1,300 attendees. While the majority of visitors were regional, some came from as far as Canada, El Salvador, and Brazil. The conference was key-noted by the legendary Ian McHarg, author of "Design With Nature" and an advocate of recognizing how structures are integrated into natural systems.[R#1,2,9]

Aside from the Green Builders conference which has been the biggest thrust in ESD's marketing efforts for the program, many other methods have been engaged. Name recognition was identified as an important goal for the program. To accomplish that, direct mail and advertisements in trade publications were used. The City's most unusual marketing effort – which some staff questioned on principle – was renting a prominent billboard to highlight the program. While staff harbored concerns about such advertising strategies, and there was no question about the magnitude of its expense which totaled \$14,000, the influence of the billboard located on the interstate and its role in raising public awareness of the program was unmistakable.[R#1]

The hallmark demonstration of the Green Builder program is the Green Habitat Learning Project. Done in cooperation with Habitat for Humanity and the American Institute for Learning, the project represented the City's first green, low-income housing and also provided skills and opportunities for "at-risk" youths. (See Case Study p.15) The demonstration was completed about a year after the program was honored at the Earth Summit in Rio de Janeiro and significantly elevated awareness of the program's broad agenda and promise.[R#1,16]

The program picked up a lot of momentum once green building penetrated the volume building market. With the construction of a "green subdivision" came greatly increased marketability and added credence for the program. Any perception of elitist design was peeled away by the prices of the Green Builder homes, which ranged from \$120,000 to \$200,000 for One and Two Star rated Wilshire homes, and which were as low as \$68,000-74,000 for Meadows at Walnut Creek's Three Star homes. The transformation in the market was clearly stated in the front-page headline in the HOMES section of the local paper read "Green Building Enters Mainstream." [R#7]

## **STAFFING REQUIREMENTS**

The program was originally staffed by Program Manager Doug Seiter and two customer liaison representatives. Laurence Doxsey joined the staff in 1991 for the research and development of the Sourcebook. In the past year the program has hired three more people for administration, field training, and commercial accounts. In the course of the program's growth to a staff of seven, one of the original two support positions has been redefined as Marketing and Education Specialist. Mary McLeod, one of the original Energy Star representatives and a former designer/builder, carries out the daily operations of the Green Builder program and works closely with the builders to aid them in research for required measures.[R#1]

# Monitoring and Evaluation

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## VERIFYING GREEN BUILDING OPTIONS

Verification of options included in a project for rating purposes varies somewhat by project. In the case of custom-built homes, ESD staff tends to be closely involved with the design process and is thus often aware of the measures included. Site visits by staff members assisting builders also help to confirm that all necessary measures for given ratings are included. For production builders, staff members are not present at every single building site, so field spot checking is used to verify program compliance. [R#1]

Monitoring the Green Builder program is made somewhat easier by tracking performed for Austin's other DSM incentive programs. Many of the measures which are required to qualify homes for Green Builder ratings are also eligible for rebates from Austin's DSM programs. Thus ESD taps the synergy between tracking Green Builder and other programs, lessening Green Builder's administrative costs and allowing program staff to concentrate on the program's more fundamental market-pull mechanism, unencumbered by rote and time-consuming program tracking.

## ESTIMATING SAVINGS

Accurately quantifying the variety of savings from Austin's Green Builder program would necessarily include performance data for several use categories with multiple variables. For example, energy savings accrue directly from energy-efficiency measures installed and also indirectly from water savings and the use of materials with low energy factors, for instance locally produced wood or brick rather than imported aluminum. Recycling also results in energy savings, although calculating these types of indirect program effects is beyond the scope of the Green Builder program.

In addition to energy savings, Green Builder has resulted in many different types of resource savings. The program creates savings of water, raw materials, trees, landfill, toxins, etc. Since the occurrence and level of savings for each of these considerations varies with each home rated, the task of accurately quantifying each type of program savings would be extremely difficult and time consuming.

ESD's goal when it developed Green Builder was to accelerate the establishment of sustainable building practices into Austin's building community. This has been the program's guiding mission. As such, staff time has been primarily devoted to this overall objective rather than quantifying the program's full resource effect using a comprehensive cradle-

to-grave analysis in any rigorous level of detail. In fact, although some homes were rated during the 1992 program year (July 1, 1992 through June 30, 1993) even a rudimentary tracking mechanism was not established until 1993, indicating the relative importance of tracking vis-a-vis the program's more important objective market transformation objective.

In fact, even at this point in the program's development and evolution, ESD lacks even a routine method for determining the energy savings for a given home or for that matter the entire program. Originally BETA software was used to calculate energy savings from the Energy Star program although the simulations were not always well documented or consistent. Currently, such simulations which would provide proxy values for energy savings are not being performed at all since Austin's BETA-proficient staff have left the program and since such calculations are neither a priority nor program emphasis. ESD has considered using other software to calculate energy savings, such as NREL's "Energy 10," but has not found one that meets its needs sufficiently.

Thus the current program lacks both post-installation metering and energy savings software. Instead, ESD has devoted its limited monitoring and evaluation dollars to track the market transformation that appears to be well underway in Austin. The City has maintained a database of all Green Builder rated homes with data regarding the measures included and the overall size and resource use of particular homes. [R#1]

Given the program's primary market transformation thrust, evaluation efforts have been minimal. This lack of rigorous evaluation and cost/benefit analyses could challenge the program and may prove to be a liability in the future. In particular, Green Builder's efficacy could be scrutinized before City Council, a threat that could potentially undercut the program and lead to profound changes that could undercut the program's holistic orientation. [R#1]

Estimated energy savings achieved by installed measures presented in the next section are based on models developed by Austin engineers. DOE 2 simulation under a "typical meteorological year" for Austin is applied to determine energy savings in Green Builder homes. Savings per measure are calculated to establish an average consumption level for One, Two, and Three Star homes, presented in the Savings Per Home table. The measures incorporated in Four Star homes were considered too esoteric to apply to any model. (To date, no Four Star homes have been rated through the program.) Engineers used a separate stock of homes for gas and electric base case homes. [R#26,27]

# Case Study: Green Habitat Learning Project

Toward the onset of Green Builder, program designers understood the need to provide a strong demonstration that green building can be done affordably. Showcasing the program's goals was greatly advanced when ESD teamed up with Austin Habitat for Humanity (Habitat) and the American Institute for Learning (AIL); an organization which works with "at-risk" youths. The end result was the Green Habitat Learning Project, a project that built a low-income home with a Three Star Green Builder rating which provided jobs and training for underprivileged youths while contributing to local economic development. The project was completed in November of 1993. [R#16]

Habitat for Humanity, the nation's fourth largest home builder, was already quite familiar with Austin's efficient building efforts and the Energy Star program. (Its office was also conveniently located directly across the street from ECSA.) Mike Myers, then ESD's Manager, recounts that together the two organizations had been contemplating the idea of doing a low-income green building project for some time. When the City had property available to sell cheaply to Habitat the idea became more than a suggestion. Teaming up with AIL further strengthened the project by adding green building job opportunities for area youths. [R#16]

The resulting home received Three Star ratings on the program's original point system for energy and building materials and Four Star ratings for water and solid waste, for an overall rating of Three Stars. Specific features designed into the Habitat Project include programmable thermostats; Faswall block wall system; xeriscaping; recycled aluminum window frames; and passive solar designs. The final product was a City-built home which was higher in efficiency than many of the homes which had gone through other City programs. Myers noted that this was a huge step forward for the program and that now the City is building green low-income housing on a frequent basis. The project has also created a spin-off program for American Institute for Learning called "Casa Verde" in the Austin area. Now other cities, including Atlanta, Georgia, have expressed interest in implementing similar projects. [R#16]

The Green Habitat Learning Project enjoyed the strong community support of 28 area sponsors including Motorola and IBM. Five area businesses extended discounts for materials and services required for the demonstration home. By extending the focus of the project to other community interests through AIL's involvement with at-risk youths the program achieved a high level of community recognition for the program and for the potential to build green cost-effectively. [R#16]

## GREEN HABITAT LEARNING PROJECT ★

### ENERGY

- programmable thermostat
- high quality duct system
- shade trees
- energy-efficient lighting
- reduced electromagnetic fields
- daylighting design strategies
- gas combination heating system
- ceiling fan
- light colored roofing/siding
- light interior colors
- passive solar design

### BUILDING MATERIALS

- recycled steel studs
- recycled aluminum windows
- reconstituted wood doors
- native hardwood cabinets
- no-VOC shelving
- recycled metal roofing
- low toxicity paints and adhesives
- recycled cellulose and cotton insulation
- chipped local Juniper mulch
- Faswall block wall system

### WATER

- copper piping for potable lines
- efficient water fixtures
- Buffalo Grass
- site graded for rainwater harvesting
- xeriscaping
- indoor/outdoor water budgets

### SOLID WASTE

- built-in recycling area
- construction waste recycled when possible
- removed site trees reused as chips
- compost system
- utilized old concrete from previous building

# Program Savings

SAVINGS OVERVIEW	ANNUAL ELECTRIC SAVINGS (MWh)	CUMULATIVE ELECTRIC SAVINGS (MWh)	LIFECYCLE ELECTRIC SAVINGS (MWh)	ANNUAL GAS SAVINGS (CCF)	CUMULATIVE GAS SAVINGS (CCF)	LIFECYCLE GAS SAVINGS (CCF)
<b>1993</b>	21	21	821	217	217	8,672
<b>1994</b>	323	344	12,905	3,151	3,368	126,048
<b>Total</b>	344	365	13,726	3,368	3,585	134,720

ANNUAL SAVINGS PER HOME	ELECTRIC HOMES (kWh)	GAS HOMES (kWh)	AVERAGE SAVINGS (kWh)	GAS SAVINGS (CCF)
<b>1 Star</b>	2,112	796	1,059	12
<b>2 Star</b>	2,263	1,036	1,281	16
<b>3 Star</b>	3,200	1,422	1,778	25
<b>4 Star</b>	N/A	1,516	N/A	54

**DATA ALERT:** Program year 1993 should be considered a pilot year when reviewing the data. Program savings are based on DOE-2 simulations and proxy values for energy savings when compared to baseline use.

Estimated energy savings for Green Builder homes are outlined in the Annual Savings Per Home table. Gas heated homes are assumed to account for 80% of the program's rated homes with electric heat pump homes accounting for 20%. (This is the approximate ratio for new construction in the Austin area.) The Green Builder program has had a total annual electric savings of 344 MWh, with a total cumulative savings of 365 MWh, and a lifecycle savings of 13,726 MWh. Energy savings measures have also resulted in a gas savings. Estimated savings for both years total 3,368 CCF in annual savings for 3,585 CCF and 134,720 CCF in total cumulative and lifecycle savings respectively.

## PARTICIPATION RATES

Much of 1993 was dedicated to getting the program in place, a tracking system set up, and projects started. A few homes were rated prior to the start of a tracking system. However, in 1993 the ESD did record 14 home ratings, half of which earned a Three Star rating. The participation of two of the region's volume builders is reflected in the figures for 1994. A total of 265 Green Builder homes were added to the program, 19% of

which were Three Star. This brought the total number of Green Builder rated homes to 279. To date the program has not yet awarded a Four Star rating although some of the Three Star ratings were very close. Program staff believe that it is important to maintain a high threshold for this top rating so that it stands out as the premier green building accomplishment.

## FREE RIDERSHIP

As discussed earlier, many builders did not need the marketing boost that the rating offers, but sought information from Green Builder on options they wished to include without the ancillary benefits of the program's rating system. Since the primary goal of the program was to act as an information resource for the area builders and to transform the building market in Austin, free ridership is not considered an issue with the program and the savings estimates presented do not reflect adjustments for free ridership.

## MEASURE LIFETIME

ESD has not assigned an average measure life for the Green Builder program. Hopefully its effects will indeed be permanent as the market is transformed such that sustainability becomes a feature considered important by all home builders and buyers. Given the permanence of many of the measures installed, including siting and basic construction practices, an average measure life of 40 years has been used to calculate lifecycle electricity savings and to determine the cost of saved energy for the program.

PARTICIPATION	1 STAR HOMES	2 STAR HOMES	3 STAR HOMES	TOTAL
<b>1993</b>	4	3	7	14
<b>1994</b>	190	24	51	265
<b>Total</b>	194	27	58	279

# Cost of the Program

<b>COSTS OVERVIEW</b>	<b>ENERGY RELATED COST</b>	<b>NON-ENERGY RELATED COSTS</b>	<b>TOTAL COST</b>	<b>TOTAL COST (Levelized)</b>
<b>1993</b>	\$167,456	\$87,253	\$254,709	\$229,562
<b>1994</b>	\$167,456	\$98,678	\$266,134	\$233,717
<b>1995</b>	\$167,456	\$231,882	\$399,338	\$350,696
<b>Total</b>	\$502,368	\$417,813	\$920,181	\$813,975

The Green Builder program was developed and fully implemented for less than a million dollars. Over a three-year history the program has leveraged the Energy Star program, effectively attracted grants to support its key research needs, and has institutionalized green building through a clever and low cost market-pull mechanism.

The design and development aspect of the Green Builder program was supported by grants from the UCETF. An initial grant of \$75,000 supported the original Green Builder guide; a second grant for \$40,000 funded the Sustainable Building Sourcebook; and a third grant for \$25,000 funded the program's demonstration project. Any Green Builder activity which was not covered by these grants fell under the Energy Star program which had a 1992 budget of \$167,456 (\$155,580 1990USD). In 1993, Energy Star was incorporated into the Green Builder program. The program's implementation costs in 1993 were \$254,709. This encompassed Energy Star's costs plus Green Builder's additional expenses. In 1994, expenditures rose slightly to \$266,134, then a budget of \$399,338 in 1995. Thus its cost for the first three years was only \$920,181.

## COST EFFECTIVENESS

To determine its cost of saved energy The Results Center has disaggregated the energy and non-energy related savings of the program. To do this it is assumed that the energy-saving portions of the Green Builder's costs are equivalent to Energy Star's cost in 1992 since Energy Star focused only on energy.

(Inversely, the difference between the 1992 Energy Star program budget and the 1993 Green Builder budget is assumed to represent the non-energy aspects of the program.) Thus the values presented in the Cost of Saved Energy table reflect only the expenditures which contributed to energy savings.

The levelized cost of saved energy at a 5% real discount rate for the 1993 pilot program was 24.11¢/kWh, reflecting low participation relative to program expenditures. (In addition, some projects started in 1993 were not completed until 1994.) In the following year, with the program fully in place, its tracking systems established, and volume builders participating in the program, the cost of saved energy dropped to 1.47¢/kWh, comparable to Energy Star's performance which ranged from 1.23¢/kWh to 2.92¢/kWh. When averaging together the first-year program start-up costs with 1994 program experience, the program has resulted in a cost of saved energy of 2.77¢/kWh based on a 5% real discount rate.

## COST PER PARTICIPANT

Program costs per rated home varied dramatically between the 1993 pilot at \$16,397 and 1994 at \$882 for an average cost per participant of \$1,660. This average is expected to decrease in future years as the initial program start-up costs are amortized over more and more green buildings and as a greater number of production builders participate in the program. Unfortunately, the program has not tracked program participants' marginal costs of building green.

<b>COST OF SAVED ENERGY (¢/kWh) (Levelized)</b>	<b>3%</b>	<b>4%</b>	<b>5%</b>	<b>6%</b>	<b>7%</b>	<b>8%</b>	<b>9%</b>
<b>1993</b>	17.90	20.91	24.11	27.50	31.04	34.70	38.47
<b>1994</b>	1.09	1.27	1.47	1.67	1.89	2.11	2.34
<b>Average</b>	2.05	2.40	2.77	3.15	3.56	3.98	4.41

# Additional Program Benefits

The Green Builder program has resulted in a range of benefits. In addition to the direct energy savings presented in the previous section, the program has created non-energy related benefits including avoided emissions, additional environmental benefits, and valuable economic development benefits.

## AVOIDED EMISSIONS

**The Environmental Benefit Statement:** As the accompanying Environmental Benefit Statement shows, electricity savings from the Green Builder program in 1993 and 1994 resulted in significant avoided emissions. For example, depending on the location where a similar program were implemented, similar success with program implementation could cut carbon dioxide emissions by nearly a million pounds.

**ESD's calculations of avoided emissions:** Determining programs' avoided emissions has been important to ESD staff as Austin was the first city in the United States to collect credits for avoided sulfur dioxide emissions. To enable this, ESD staff have calculated the emission reductions and correlating environmental benefits for each of their DSM programs based on Austin's electricity generation resource mix. The chart below presents avoided emissions and environmental benefits in dollar values for 1994 determined by ESD staff.

As a new program, and one which focuses only partly on energy conservation, Green Builder represents less than 1% (0.78%) of ESD's total DSM accomplishments. The program's contribution to Austin's avoided emissions as calculated by the ESD is shown in the table below. For 1994, ESD's avoided emissions totaled 775 tons of SO<sub>2</sub>, 649 tons of NO<sub>x</sub>, 63 tons of total suspended particulates (TSP), 77 tons of CO, and 313,268 tons of CO<sub>2</sub>. Austin's estimations of the societal dollar values from its avoided emissions are also presented. These were derived based on a combined assessment of both the short-range (local) and long-range (global) impacts. For ex-

### THE ENVIRONMENTAL BENEFIT STATEMENT:

The Environmental Benefit Statement is intended to provide approximations of avoided air emissions for the electricity savings from a particular program when applied to another region or service territory. To transfer Austin's program success to your own situation, first determine the representative marginal power plant for your situation by perusing the left hand column of the table. What type of generation will be avoided if you enjoy Austin's level of success with a similar program in your region or service territory? Once you have determined the proxy power plant based on fuel type, heat rate (the efficiency of the power plant), and sulfur content in the fuel, move to the right across the row selected to find approximations of avoided emissions should you enjoy Austin's level of success. Note that the coefficients in each cell of the table contain a 10% credit for transmission and distribution losses avoided through energy efficiency.

\* TSP = total suspended particulates; NSPS = New Source Performance Standards; BACT = Best Available Control Technology.

ample, the figure calculated for SO<sub>2</sub> reflects both its long-range contribution to acid rain, a fixed number from the EPA, and its effects on the area immediately surrounding the plant. Total suspended particulates, on the other hand, have no significant global impact but are a genuine issue on the local level.

**The dollar value of avoided emissions:** Weighing the dollar value of these impacts is a highly customized process. While the value of an avoided ton of carbon dioxide has been assigned dollar values by various experts ranging from \$5 to \$30, Austin has selected \$20 for its calculations, what it considers a suitable mid-range value to ascertain the dollar value of

<b>GREEN BUILDER'S ENVIRONMENTAL BENEFITS</b>	<b>TONS PER YEAR REDUCED</b>	<b>DOLLARS PER YEAR</b>	<b>DOLLARS PER TON</b>
<b>Sulfur dioxide (SO<sub>2</sub>)</b>	6.1	\$8,727	\$1,426
<b>Nitrogen oxides (NO<sub>x</sub>)</b>	5.1	\$2,980	\$582
<b>Total suspended particulates (TSP)</b>	0.5	\$533	\$1,070
<b>Carbon monoxide (CO)</b>	0.6	\$259	\$424
<b>Carbon dioxide (CO<sub>2</sub>)</b>	2,473	\$49,459	\$20

## ENVIRONMENTAL BENEFIT STATEMENT

➔ **Avoided emissions based on 365,000 kWh saved 1993-1994**

<i>Marginal Power Plant</i>	<i>Heat Rate BTU/kWh</i>	<i>% Sulfur in Fuel</i>	<i>CO2 (lbs)</i>	<i>SO2 (lbs)</i>	<i>NOx (lbs)</i>	<i>TSP* (lbs)</i>
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<b>Coal</b>	<b>Uncontrolled Emissions</b>					
A	9,400	2.50%	787,000	19,000	4,000	0
B	10,000	1.20%	839,000	7,000	2,000	2,000
<b>Controlled Emissions</b>						
A	9,400	2.50%	787,000	2,000	4,000	0
B	10,000	1.20%	839,000	1,000	2,000	0
C	10,000		839,000	5,000	2,000	0
<b>Atmospheric Fluidized Bed Combustion</b>						
A	10,000	1.10%	839,000	2,000	1,000	1,000
B	9,400	2.50%	787,000	2,000	2,000	0
<b>Integrated Gasification Combined Cycle</b>						
A	10,000	0.45%	839,000	1,000	0	1,000
B	9,010		755,000	1,000	0	0

<b>Gas</b>	<b>Steam</b>					
A	10,400		458,000	0	1,000	0
B	9,224		397,000	0	2,000	0
<b>Combined Cycle</b>						
1. Existing	9,000		397,000	0	2,000	0
2. NSPS*	9,000		397,000	0	1,000	0
3. BACT*	9,000		397,000	0	0	0

<b>Oil</b>	<b>Steam--#6 Oil</b>					
A	9,840	2.00%	662,000	10,000	1,000	1,000
B	10,400	2.20%	703,000	10,000	1,000	1,000
C	10,400	1.00%	703,000	1,000	1,000	0
D	10,400	0.50%	703,000	4,000	1,000	0
<b>Combustion Turbine</b>						
#2 Diesel	13,600	0.30%	879,000	2,000	3,000	0

<b>Refuse Derived Fuel</b>						
Conventional	15,000	0.20%	1,044,000	3,000	4,000	1,000

## Additional Program Benefits (continued)

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its programs' environmental benefit. ESD determined that the Green Builder program resulted in over \$50,000 worth of annual environmental savings, approximately one-fifth the cost of the administering the program in that year. [R#28]

### **OTHER ENVIRONMENTAL BENEFITS**

Avoided emissions, important as they are, are but the tip of the iceberg in terms of Green Builder's environmental benefits. Because the goal of the program is to increase the efficiency with which Austin consumes energy and to align new construction practices with sustainability, there are clearly numerous and broad environmental benefits associated with the program. Given the all-encompassing nature of sustainability, Green Builder's environmental benefits range from short-term and well-defined to multi-generational and highly ambiguous, complicating the program's direct justification while reinforcing the merit of such an approach to energy efficiency.

**Water conservation:** The program's emphasis on water conservation, highly important to the Austin area, has been very important, causing participants to consider both interior and exterior water use. Not only do Green Builder homes use less water,... but they have fostered new industries surrounding grey water systems, xeriscaping, and the like.

**Waste reduction:** The program's holistic orientation also encompasses waste reduction, from choice of materials (such as locally harvested timber, avoiding large-dimension timbers, etc.) to construction recycling, to establishing recycling centers in homes as well as composting. Naturally such an emphasis will alleviate pressure on local landfills.

**Building materials and indoor air quality:** The program's emphasis on ecologically-friendly building materials not only addresses "up-stream" resource consumption (for instance less toxins used in product manufacturing) but is essential to a key program result: improved air quality. As many building materials outgas volatile organic compounds and the like, Green Builder provides for healthier habitats, an important feature given the increasing concerns about indoor air pollution.

**Electromagnetic fields:** Another feature of Green Builder homes is the program's orientation regarding electromagnetic fields. Concerns about the unknown effects of pervasive fields has resulted in mitigation strategies that may prove to be more and more important as both the science and public understanding of electromagnetic fields evolves. Through this program emphasis, contractors and the entire shelter industry in Austin are becoming more aware of the potentially grave EMF problem.

### **ECONOMIC DEVELOPMENT BENEFITS**

One of the most attractive features of the Green Builder program has been its catalytic effect on the local economy. First off, Green Builder and its predecessor program are saving City residents money on their bills. As ESD's Maureen Scanlon suggests, all one has to do is compare Austin with the neighboring city of San Antonio. While residential rates there are lower, residential bills in Austin are lower, suggesting that the City has tapped efficiency for citizens' economic benefit.

**New business activities:** Green Builder has ushered in a host of new business activities in Austin from selling green products – such as Faswall, Stramite, and low-VOC paints – to services and new business opportunities for advanced home construction techniques such as straw bale construction and rain water harvesting systems.

**Supporting indigenous products:** The program's emphasis on sustainability is supported by the notion that local development should be built with local resources. This geographic bearing has supported area businesses such as the plastics industry in Texas.

**A new real estate niche:** Green Builder has also benefitted Austin's real estate market by creating a new niche with "green" homes, further supporting the real estate market through product differentiation and value-added services.

**At-risk youth job opportunities:** An unforeseen, spin-off benefit of the program has been job creation for at-risk youth in green building practices, serving to elevate the stature of the program within the City of Austin.

# Lessons Learned

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## **Green building practices appeal to the citizens of Austin:**

The Green Builder program's success has been a most pleasant surprise for the Energy Services Division staff. While the green building concept appealed to staff as a means of enhancing the quite successful Energy Star program, no one expected it to enjoy the early level of success that it has. Furthermore, no one anticipated that it would become internationally acclaimed as a model of sustainable development. The number one lesson learned through the program is that citizens in Austin value green building.

## **Austin's ultimate success has been in transforming the shelter industry:**

The public's quick acceptance of the Green Builder program has accelerated its ultimate effect: market transformation. The ultimate goal of the program is to shift building practices in Austin towards sustainability. This has certainly occurred as a result of the program. Not only have contractors become certified as green builders but green building materials are now commonly available in local stores. The Green Builder program has clearly moved the market. By the turn of the century, nearly all homes built in Austin will be green; a testament to the speed at which green building can become accepted and even institutionalized in a particular city or region.

## **The program's market-pull mechanism was a key factor in creating an effective partnership with area professionals:**

Builders don't like to be regulated. Instead they are eagerly looking for ways to increase their profitability. As such, the building community in Austin was quite accepting of the Green Builder program. In it they saw a partnership, a co-marketing opportunity, and a means of creating value-added products for their home buying customers. By soliciting the participation of the building community early in the program design process, and by highlighting the program's marketing advantages to them, ESD staff was able to earn the building community's approval of the program. According to Doug Seiter the program's core marketing mechanism has succeeded: "Builders have taken advantage of the program's basic mechanism to enhance their own marketing potential."

## **Working closely with the building community has been a key to success:**

Program designers recognized early on that to make the Green Builder program "fly" it would have to be accepted by the building community first and the buying public second. Thus the ESD staff effectively created and carefully maintained a dialogue with the building community throughout the life of the program. ESD has maintained a close working relationship with the regional builders association throughout the program, including program design and modifications and even in coordinating the Green Builder conferences. Rather than fueling conflict between environmentalists and developers, Green Builder program staff has nurtured a cooperative relationship so that common ground between the two could be reached and the program goal of sustainability could be effectively meshed with developers' needs to sell buildings.

## **Education and outreach is essential to hurdle the information barrier that faces sustainable building:**

Program staff have found that most home buyers are not considering if their house paints contain toxins or how many acres of trees it took to build their dream homes. Most home owners don't realize that they are wasting money by heating a house that is not weatherized, much less contributing to greenhouse gases and other pollutants. No one ever asks about how the lot was cleared or how excess building materials were discarded. Even those who are aware of these effects and want to be environmentally conscious don't know the pragmatic options that are available to them. And while some builders may have known of sustainable practices, they have been largely unaware of their marginal costs, how to sell them, not to mention how reliable they are. Thus the ESD staff has played a key role in providing solid information and in serving as an objective information resource for the community.

## **Introducing new building practices to the building community was also a major challenge:**

The initial task of determining what green building options were available for the Austin area in terms of resources, materials, costs and services, was an enormous effort. Once the staff had "put their arms around the body of green building information," it not only

## Lessons Learned (continued)

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needed to be digested but effectively passed on to home builders and buyers via the Sourcebook and other outreach means. This required not only raising awareness but in many cases reducing skepticism as well. Since the building industry is characteristically slow to change, new materials and construction methods tend to be questioned by builders because of their higher costs, uncertain reliability, and dubious marketability. Likewise, some new technologies are met with resistance by area inspectors, another sign of the industry's sluggishness and the inertia that such programs have to overcome.

**Product availability and contractor capability also challenged the program launch:** Accompanying the hesitancy of the building industry with regard to new products and practices, was the unavailability of new products and the inexperience of the trades using them. In some cases new services needed to be introduced to the market. For example, prior to the program rain water harvesting was beyond the scope of local design professionals. Furthermore, Austin had no regulations regarding rain water harvesting since it had previously only been practiced in rural areas. While at the onset of Green Builder there was no one to assist with this procedure, two companies have cropped up in response to the program's requirement for rain water or grey water harvesting, indicative of the program's market-pull mechanism.

**Another challenging factor has been the program's emphasis on saving energy while the City's DSM efforts have been focused on load management:** While Green Builder has become an undeniably valuable program, from a utility perspective it has been somewhat out of line. The Austin Electric Utility Department's DSM initiatives have been largely focused on load management while Green Builder is an energy-saving program. However, although the program focuses on energy saving and non-energy related benefits, the peak reduction associated with the program has justified it to the utility thus far.

**Being honored at the Earth Summit gave the program a powerful launch:** Receiving a major international award at the Earth Summit in 1992 certainly helped to validate the program and gain the required support, particularly from the Austin City Council. Recognition at the Earth Summit helped to

publicize the program at home and internationally by distinguishing it as a model for sustainable building.

**Green building can be affordable:** While it is generally more expensive initially to build in line with green building practices, a production builder in Austin proved that green need not be out of reach financially. One of the largest green building projects in the program was a subdivision of Three Star homes listed at a purchase price of \$70,000. In addition, the Sourcebook contains information on the relative cost of materials, indicating those building options which are considered "satisfactorily priced."

**Quantifying the value of green homes is difficult:** Since the green home market is a relatively new development, builders, sellers, and buyers are uncertain of how green building materials and practices affects home prices. According to program staff, appraisers have had considerable difficulty ascribing values to rated homes and are only now "catching up" in terms of considering the added value of green improvements. On the other hand, consumer demand will be the ultimate measure of value for green building. Austin's success, thus, can be largely measured by the rapidly growing acceptance by the production builders anticipating great demand for their green developments.

**The greatest catalyst for market transformation is the acceptance of production builders:** Program staff believe that getting the production builders on board has been the key avenue to program success and ultimately for the intended market transformation of building practices in Austin. They have found that most custom home builders who came to ESD did so to take advantage of the program as an information resource, rather than being concerned with having their homes rated since they already had buyers for them. These builders simply sought to learn more about green building practices and materials to fully satisfy their clients.

In practice, staff believe that the real value of the rating was realized when the production builders came on board. For them the Green Builder rating functions as the marketing tool it was meant to be. In fact, Doug Seiter recounted incidences with the Energy Star program where builders called him say-

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ing that they were losing sales to competitors with rated homes. This link between green building and sales has been key to transforming building practices.

**Simplifying the program design boosted participation:**

The Green Builder program began with a point system which consisted of a lengthy 134 item matrix for evaluating a particular building. By changing the rating system to a menu of measures which needed to be included to earn a specific rating, the entire application was reduced to four pages and participation became greatly simplified. Moreover, it simplified the program from a design standpoint. With the point system the designer or builder needed to determine all features included to accurately calculate the rating. Substitutions could easily change the point value and complicate the rating process. On the other hand, the newer menu approach provides lists of packages that can be easily understood and implemented. This approach has effectively attracted production builders who need concise and easy means for participating in the program. It also greatly relieved staff time required for ratings based on the complex matrix of measures.

**The Green Builder Conference has been beneficial but has now become a tremendous burden:** The annual Green Builder Conference has been an invaluable tool in raising awareness of the program and green building discipline but has now become an enormous burden for ESD staff. Preparing the 1995 conference, for example, demanded the full-time attention of most of the Green Builder staff for nearly six months. Fully 1,300 participants attended the two-day conference and the City broke even financially, but the staff time involved was excessive. While the conference is the program's most powerful marketing tool, staff members are questioning whether they can continue to conduct it at its current or even larger level.

**Austin's early success will be magnified in its internal and external effect:**

Given its success Austin now can embellish the program in a number of ways. For instance staff plan to introduce a parallel program for the commercial sector next year. Already the City Council has adopted green guidelines for all municipal facilities. In addition, the success in Austin will enable many other communities throughout the United

States and around the world to establish green building programs. Austin's pioneering work has laid a solid foundation for similar initiatives, which together will further substantiate and expand the green building movement.

**Finally, Green Builder has been a function of the public will, and as such is necessarily politically fragile:**

Other communities that seek to implement similar green building programs must be fully cognizant of the political fragility of Austin's program. While implemented successfully by the ESD with the complete support of the City Council, currently Council is considering privatizing the City's municipal electric utility. Will this change the role of ESD in delivering energy efficiency services? At this time no one knows. Thus the organizational foundation and future of the Green Builder program is somewhat uncertain, for just as the community's awareness and political support for green building led to program success, winds of political change could disrupt the program. Thus a key lesson for other communities is to consider how to fully thrust the program into the private sector – fully exploiting public resources and political support when available – without completely depending on the government to foster the program forever. Currently, the Green Builder program itself is generally supported by the entire Council while the ECSD enjoys support from four out of seven Council members in Austin while two of the four are up for re-election.

# Transferability

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Nationally, the green building movement is developing at a fantastic rate suggesting that this new orientation to integrated resource management has struck a chord within the public's sentiment. While saving energy has been the primary focus of conventional DSM programs – savings that directly translate into dollar savings – Austin's Green Builder program with its broader agenda has enjoyed a surprising level of success, suggesting that the public finds green building far more appealing than simply saving energy. As such, green building represents an exciting new avenue for achieving energy savings while addressing other resource use as well.

Polls reveal that the vast majority of Americans claim to be environmentalists. Few, however, have invested in cost-effective energy efficiency improvements. Thus green building may prove to be a valuable way to circumvent the singular focus on the wasteful use of energy and to far more effectively save energy, water, and other resources in an integrated fashion, potentially representing a quantum leap above energy efficiency retrofits.

Austin's program is a powerful model of how to design and market green building. The Green Builder program can now be tailored by communities across the country to serve their specific circumstances and objectives bolstered by Austin's success where the program has been implemented at low cost and has genuinely supported the economic development of the City. New types of jobs, such as installing grey water collection systems and building straw bale homes, have been created. Furthermore, an awareness that homes are ecosystems complete with positive and negative feedback loops has been nurtured. The Green Builder program has not only given Austin a great deal of external acclaim, but has also provided for added pride in the local community, features that all communities aspire to boast.

Green building practices can be transferred and replicated in many ways. For instance green building practices – supported by the careful analysis of building materials conducted in Austin – can be implemented by individuals, developers, or even corporations in the absence of formal green building programs. Austin staff report that they have been approached by all sorts of entities interested in green building. The Disney corporation, for example, sought staff consultation for a new amusement park; the U.S. Department of Defense is considering implementing a green building program of its own.

Green building programs can mimic Austin's efforts and/or can be adapted for other customer segments through modified program designs. The principles embedded in this Profile

might also be applied to regions or even nations. Why can't larger jurisdictions employ green building program concepts akin to the Green Builder program?

## **TRANSFERABILITY TO OTHER COMMUNITIES**

Austin's success has led to a great deal of external interest in the Green Builder program from afar. ECSD receives as many as fifty calls a week regarding green building and has distributed over 300 Green Builder Guides and nearly 800 Sustainable Building Sourcebooks. Inquiries about the program have come from all sorts of communities around the country including jurisdictions in Colorado, Oregon, California, Pennsylvania, Georgia, Florida, and North Carolina. Internationally, Austin has been contacted from across North America as well as from Europe, Asia, South America, and Australia.

Recently the State of Colorado adopted the Green Builder program. The new Colorado Green program is a statewide program being promoted by the Governor's Office of Energy Conservation which has built upon Austin's model by explicitly integrating land-use patterns in the program. Rather than receiving bonus points or using progressive land use as a bargaining chip, Colorado's program incorporates the wise land-use practices from the start. [R#13]

## **OTHER CUSTOMER SEGMENTS**

Green Builder has been unquestionably successful but has been so solely within the domain of residential new construction. Can the program be modified for residential retrofits? Mike Myers believes that the concept could be used for retrofits but that in such a scenario a program driven by prescribed measures may be more appropriate than a rating system. For instance, a home owner may be able to check off a series of prescribed measures to earn a green building distinction far more easily than trying to force fit a package of measures that would earn him or her a Three Star rating. Imagine the difficulty in retrofitting homes to incorporate grey water systems or eco-friendly wallboard! On the other hand, a home owner may be able to address prescribed measures such as lighting retrofits, planting shade trees, and increasing attic and under-floor insulation that could earn a green home rating.

Austin is currently expanding Green Builder to the commercial sector. In the past year the Energy Services Division has developed a Commercial Green Building program that was implemented on December 1, 1995 and that will incorporate direct financial incentives. While Green Builder has largely relied on public acceptance of and desire for green materials

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and thus rebates have been minimal, staff believe that “to move” the commercial sector direct financial incentives will be necessary. This points to another program design option, whether or not to incent green building practices beyond the market mechanisms presented in this Profile.

Communities can also apply green building to municipal facilities. In these cases use of rating systems again seems less appropriate. Since there is no need for market-pull forces in the civic segment – as properties are not bought and sold – use of ratings would be unnecessary and burdensome. Instead the Austin City Council mandated sustainable building practices for its own municipal facilities and all civic buildings have been ordered to follow a set of Sustainable Building Guidelines. Like municipal programs that foster procurement of recycled paper, for example, cities can establish building codes for their municipal facilities which can raise awareness of green materials and green practices, saving money and resources while demonstrating their applications to the general public.

#### **BROADENING THE PROGRAM SCOPE**

While Austin’s program is certainly noteworthy as is, even it can be embellished and refined in a number of ways using mechanisms such as bonus points and by increasing the scope of the program. Austin has already expanded the concept of sustainable development into the realm of land-use planning. Developers there can now earn bonus points for environmentally friendly and community-oriented designs such as narrow streets and bike paths and the construction of community parks. Over time, measures that are now eligible for bonus points may be incorporated into the program’s Four Star rating system. Perhaps ultimately, as the program matures in time, the program will necessarily have to evolve to having a Five Star level, maybe Six, Seven....!

Austin’s Green Builder program presents one successful model for promoting sustainable building. Regardless of the model employed to cultivate green building, it is clear that the notion of environmentally friendly development is coming into its own. Sustainable materials are entering the building market and becoming more and more commonplace as consumer demand drives their use. Trade associations such as the National Association of Home Builders are entering the picture as well with an increasing focus on sustainability. The American Institute of Architects selected sustainability as the theme for its 1993 convention. Corporations are even stepping up to the plate. Walmart, for example, is now committed to using sustainably harvested lumber in future developments.

David Gottfried of the U.S. Green Building Council, a non-profit coalition of building professionals for the promotion of sustainable building practices, reports that in addition to the rating system successfully demonstrated in Austin there are a number of other green initiatives that support this broad movement. He believes that the green certification of building materials through such initiatives as Green Seal and Scientific Certification Systems and green building standards established by American Society for Testing and Materials and ASHRAE are similarly important contributors to the rise of sustainable building. Acceleration in research and development of green products as well as education and outreach are also positive indicators. Gottfried suggests that the Green Builder program must be seen as part of a wave of activity featuring green building as a path to sustainable development. [R#19,21]

#### **HOW TO DEVELOP A GREEN BUILDER PROGRAM**

Staff in Austin report that developing a green builder program is a time-consuming, all-encompassing effort that will only pay off over time. Timing has clearly been key to Austin’s success as was gaining international recognition that led to increased local support. But a universal need in establishing any green builder program is raising awareness and gaining the support of three distinct constituents: politicians, builders, and home buyers.

**Gaining political support:** The first step to establishing a green builder program in any community is to raise awareness of the values of such programs and to earn the political support necessary to get a program off the ground. Experiences have shown thus far that to effectively engage a successful green building program, the complete cooperation and support of community leaders is required. In each of the communities that have implemented green building programs (Portland, Oregon; Jacksonville and Dade County, Florida; Santa Monica and San Jose, California; etc.) political support was present and proved to be a necessary precursor. Without the endorsement of the local government officials and community leaders such programs will never get the support they need to become solidly rooted and to grow strong.

**Priming the building community:** While building political support for green building, the entire shelter industry must be primed with the green building concept and its potentials as well. Ideally, by engaging the building community they can “buy-into” the program and assume a degree of pride and ownership in it. Program staff suggest that including the area’s builders and designers in the planning stages and maintaining continued communication is essential for developing an effec-

## Transferability (continued)

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tive program in which they can fully participate. By making builders a part of the process, success in transforming their building practices is far more likely than developing a program with which they feel threatened and degrees of animosity.

**Firmly rooting the market-pull mechanism:** Developing a market for green homes through outreach and education is also critical. Without a market for homes that builders build green, a green builder program simply cannot fly. Not only do the builders need to know how to build green homes, but realtors, appraisers, lenders, and most especially buyers must understand the benefits of green homes. This is key to the market-pull mechanism that is fundamental to the program design. Because the program relies on market forces in order to be effective, the market must be properly informed and stimulated.

**Exercising patience:** Regardless of the program design, sustainable building programs will likely require relatively long germination periods to become truly effective. (Austin's "magic" may be difficult to quickly replicate again and again.) Annette Osso of Public Technologies Inc. cautions interested communities that green building programs do not get established overnight. Instead, the political and professional infrastructures that are needed to support green building programs take time to establish. In Austin the support of the City Council was developed over several years and was greatly enhanced by Austin's award at the Earth Summit, what program staff now consider a very important external event leading to program success. Likewise, a relationship with the building community was nurtured for seven years beginning with the Energy Star program. These long-term components make patience and dedication essential to the list of attributes necessary for successful green building programs. [R#14]

**Drawing upon existing resources:** Thanks to the efforts of the City of Austin and others, there is now fortunately a quite extensive list of available resources on sustainable building practices that can propel efforts begun today. While many aspects of green building will continue to be refined and tailored for specific regions and situations, and green building will become more and more refined with greater analysis and experimentation, a great deal of groundwork has been accomplished to support subsequent initiatives. The select references below are provided as starting points for interested readers:

"The Sustainable Building Sourcebook," Environmental Conservation Services Department, Energy Services Division, City of Austin, 209 East 9th Street, Austin, TX 78701 (512) 499-3500. This 450-page reference on green building practices is available for \$25 plus tax and shipping.

"Sustainable Building Sourcebook," Urban Consortium Energy Task Force, Public Technology, Inc, 1301 Pennsylvania Ave., NW, Washington, DC 20004-1793 (202) 626-2400. This is the Urban Consortium's version of Austin's own Sourcebook and is intended to be a manual for establishing green building programs in other jurisdictions. To order this report call (301)490-2188. The cost is \$18 for PTI members and \$50 for non-members.

"Local Government's Sustainable Building Guidebook," Public Technology, Inc., 1301 Pennsylvania Ave., NW, Washington, DC 20004-1793 (202) 626-2400. This publication was produced cooperatively by Public Technology Inc., the U.S. Green Building Council, and the U.S. Environmental Protection Agency and presents a sound discussion of sustainable development along with an overview of strategies, examples of successful projects, and a list of resources. To order, call (301)490-2188. The cost is \$18 for PTI members and \$50 for non-members.

U.S. Green Building Council. This coalition of builders, architects, building owners and managers, product manufacturers, environmental organizations, utilities, and government agencies focuses on environmental issues associated with building and development. For more information call (415) 398-3900.

"A Primer on Sustainable Building," Green Development Services, Rocky Mountain Institute, 1739 Snowmass Creek Road, Snowmass, Colorado 81654 (970) 927-3851. This primer discusses the means and benefits of green building and includes a strong reference section. The book is available for \$16.95.

"Environmental Building News," RR 1, Box 161, Brattleboro, VT 05301 (802) 257-7300. A highly acclaimed journal and one of the best publications available on environmental and sustainable issues in the building industry. Annual subscriptions are available. Individual rate: \$67, institutional rate: \$127.

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