

Sacramento Shade Tree Program: Save Energy--Plant a Tree

Carroylin M. Threlkel, Sacramento Municipal Utility District

Introduction

As a part of its continuing effort to promote energy efficiency and build a 700-800 MW Conservation Power Plant, Sacramento Municipal Utility District is promoting the use of natural cooling through a major shade tree planting program.

In these times of complex high-tech solutions, SMUD customers are responding overwhelmingly to the idea that they can contribute to energy efficiency by doing something as modest and natural as planting a tree. Not only can they impact their own energy use, but they can have a positive impact on the urban heat island effect which plagues any large metropolitan area. SMUD funds the program which provides the trees, stakes, ties, fertilizer, necessary educational materials, and staff at the Sacramento Tree Foundation.

The program relies on community volunteers for the actual planting and maintenance of the trees. The people who do the actual work of planting are more actively involved with the long-term well-being of the tree. It is this grass roots, individual support for the program that has made it so successful.

Program Delivery

Sacramento County residents contact SMUD and express interest in the Shade Tree Program. A referral is completed and forwarded to the Sacramento Tree Foundation. Sacramento Tree Foundation staff then contact the referral and develop additional referrals in the same vicinity through neighborhood meetings, door hangers, etc. STF staff/volunteers visit each referral, helping them to choose which of the 19 varieties of trees best meets their needs and desires and to identify the proper placement of the trees. A neighborhood planting is then scheduled. The STF staff and volunteers instruct the residents in proper planting procedures for the trees, but the residents dig their own holes and actually plant their own trees. If a tree recipient is physically unable to plant the trees, volunteers will do so. To date, plantings have been held at nearly 7,000 homes, 30 businesses and 25 schools. Also, follow-up visits have identified that approximately 1,000 trees had died--or just over 3% mortality rate.

Tracking and Stewardship

Every tree in the Shade Tree Program is tagged with an identification number and is entered into a database. The trees are then visited by volunteers who note the condition of the trees as they develop. This stewardship aspect is crucial to the program in that it provides the data by which to judge how successful the program is from a tree mortality standpoint, and it reinforces the homeowner's knowledge of caring for the trees. Tree recipients receive quarterly tree care tips, and the identification tag on the trees provides an 800 number individuals can call for guidance if the tree begins to fail or is harmed.

Energy Savings

Computer models have indicated that summer cooling savings can range from 20% to 40% when structures are properly shaded by trees. Actual monitoring conducted by the California Institute for Energy Efficiency and SMUD in the summer of 1991 indicated that such savings are indeed achievable (Akbari et al. 1991).

The shade trees utilized in the Shade Tree Program are 5-gallon containers and are approximately three years old when planted. Although some savings occur as early as five years, true savings begin to occur at 10 years and beyond. Based on trees reaching full maturity at 20 years, conservatively a mature tree will provide approximately 25% savings of air conditioning needs or 350 kWh per household per year. Savings in the 20th year of the program would be 50-70 MW of peak load reduction; 250-300 million kWh cumulative savings. Also, regarding CO₂ impacts, 50,000 tons of CO₂ would be directly sequestered by the trees and 150,000 tons would be eliminated from supply side requirements. The data is based on 500,000 trees planted, at an average of four trees per household over a 10 year period.

Budget

The budget for the program was approximately \$1.6 million for the first 15 months of the program. It is expected that the budget will be approximately \$2.0 million per year for the remaining nine years of the

program. Currently, the levelized cost of the program is approximately 4.1¢ per kWh. However, as the program becomes routinized it is anticipated that the levelized cost will be in the 3.0¢ range.

Objectives and Desired Results

The objectives of the program are to (1) save energy and mitigate the effects of urban heat islands, (2) reduce customers energy bills by reducing their air conditioning load, (3) create a more healthy community through cleaner air, (4) create a more beautiful environment and (5) promote a strong community spirit through the Sacramento Tree Foundation, neighborhood plantings and volunteers.

The desired results are multifold--documenting actual energy savings is a high priority, as is demonstrating the impacts of increasing urban forests on air quality and ambient temperatures. Equally important is the promotion of renewed community involvement in SMUD's Conservation Power Program. Finally, the development and promotion of new and perhaps unique partnerships to work cooperatively toward the solutions of some of today's issues with the environment and the economy is a high priority of SMUD.

The ultimate impact of the program will be to double the size of Sacramento's current urban forest and the realization of substantial energy savings which precludes the need to build expensive new power plants.

Future Activities

Future activities must be carefully planned to meet the ultimate goal of planting 500,000 trees by the year 2000 and to maintain the high level of community interest and involvement. This is recognized as a necessity for any program which spans a decade and is largely dependent on public participation. The challenge is to build and maintain long-term community involvement and interest in the program.

New efforts to build interest and support for the program include working with the local developers and builders to plant more than the requisite one tree at the time of construction and to work with their customers as they take possession of their new homes. Developing a close working relationship with the local California Landscape Contractor's Association to encourage the planting of shade trees, properly placed, during their regular business activities is currently under way. These efforts have been met with enthusiasm and support and encourages us as we look to additional groups, associations, and approaches.

Reference

Monitoring Peak Power and Cooling Energy Savings of Shade Trees and White Surfaces in the Sacramento Municipal Utility District (SMUD) Service Area, An Interim Report (1991), by Akbari, Huang, Sailor, Taha, Heat Island Project, Energy Analysis Program, Lawrence Berkeley Laboratory; and Willem Bos, Sacramento Municipal Utility District (SMUD).