THE URBAN CONSORTIUM

PTI's Urban Consortium is a partnership for changes. With leaders from 50 of the nation's largest cities and counties, the Urban Consortium is dedicated to all urban areas that are the foundation of America's economic and social health. Top elected and appointed officials join together in a Consortium that seeks new partnerships to ensure that the obstacles to a secure, healthy and safe life are removed for citizens as well as businesses to flourish. Established in 1974 to explore the application of technology to pressing problems in large urban jurisdictions, the Urban Consortium (UC) has pioneered the development of many groundbreaking management systems and technologies for communities. Many of these solutions enforce and support the concept of Public Enterprise; a term coined by PTI to describe an entrepreneurial approach to improving services to citizens while generating non-tax revenues.

The Urban Consortium Energy Task Force (UCETF)

For over ten years, the UCETF has been a leader in developing local strategies responsive to the national energy situation and critical environmental concerns. The mission of the Task Force is to:

- improve energy efficiency, cut costs and develop revenue from local energy assets
- develop innovative yet practical approaches in energy management
- create sustainable programs that balance the economic vitality of local governments with energy, environment and quality of life issues
- provide a stimulating arena where local government officials can share experiences and gain valuable perspectives on energy technologies
- address the overlap between energy and environmental policy issues

UCETF membership includes elected officials, management and technical professionals from urban cities and counties. Its links to national organizations, such as the National Association of State Energy Officials (NASEO), the National League of Cities, National Association of Counties, and the International City/County Management Association assures the wide-spread exchange of information and technology. The UCETF applied research and development program, funded in part by the US Department of Energy, has successfully addressed diverse energy problems, identifying solutions for our nation's largest urban cities and counties. Some of the UCETF's achievements include:

- saving local governments and citizens millions of dollars by lowering energy bills
- developing and implementing sustainable energy planning methods and programs for cities and counties
- testing environmentally sound alternative fuels and means for fuel distribution in municipal fleets
- making existing and new buildings more energy efficient by using new technologies and education programs
- creating joint utility and local government programs to offer residential, commercial and industrial sector incentives for sound energy management practices
- evaluating and combining project results for replication in other cities and counties
- building the capability of local government staff and leveraging public funds with private investments

Public Technology, Inc.

PTI is a non-profit institution created in 1971 by the major national associations of local and state governments. Our mandate is to create and disseminate new technology in society, responsive to the needs of local governments. Today, the National League of Cities, the National Association of Counties, and the International City/County Management Association provide policy leadership and sponsor the efforts of PTI.

PTI uses a consortium of entrepreneurial and innovative cities and counties to provide an effective and coordinated urban laboratory in the technology research, development and commercialization cycle. PTI also seeks to involve local government in technology standard setting processes. PTI's work is conducted through 3 task forces, Energy, Environment and Telecommunications and Information.

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JULY 1993

UPGRADE ENERGY BUILDING STANDARDS AND DEVELOPING RATING SYSTEM FOR EXISTING LOW-INCOME HOUSING

Energy Task Force
of the Urban Consortium
for Technology Initiatives

CITY OF MEMPHIS
Dr. W.W. Herenton, Mayor

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MASTER

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**UPGRADE ENERGY BUILDING STANDARDS AND DEVELOP
RATING SYSTEM FOR EXISTING LOW-INCOME HOUSING**

CITY OF MEMPHIS
Dr. W. W. Herenton, Mayor

PREFACE

1992 Urban Consortium Energy Task Force Publications

With staff, management, and business services provided by PTI, the Urban Consortium (UC) addresses the critical needs of large local governments through 3 task forces: Energy, Environment, and Telecommunications and Information. The Urban Consortium Energy Task (UCETF) was set up with the main objective to improve urban energy management and decision-making through applied research and technology transfer.

The UCETF focuses on developing and sharing new approaches and innovative solutions to energy management problems with local governments. Projects are organized in thematic units and co-managed by a member of the Task Force.

A description of the Units and projects included in the 1992 program are as follows:

ENERGY, ENVIRONMENT, ECONOMIC AND SOCIAL DEVELOPMENT

"Sustainability" is a planning goal to provide an integrative systems approach to meeting all our needs for today and tomorrow. Evaluating the needs of citizens and developing effective and efficient ways to meet those needs is a primary responsibility of local governments. Cities and counties are currently beset by a wide range of problems that in fact are symptoms of some common and pervasive ills. Our problems with energy, environment, economic and social development are related in a complex and interdependent way. These problems, therefore, cannot be effectively solved through a piecemeal approach without recognizing and addressing the interdependent relationships between these areas. The 1992 Energy, Environment, Economic and Social Development consist of:

Dade County, FL — A Long Term Urban Carbon Dioxide Emission Reduction Program

Pima County, AZ — Sustainable Community Implementation Partnership

Portland, OR — Sustainable Business Development Program

San Jose, CA — Negotiating a Demand Side Bid: The City of San Jose Case Study

San Jose, CA — "Green Aisle" Research Program

Santa Clara, CA — Fuel Cell Demonstration Partnership Program

Austin, TX — Sustainable Building Sourcebook

Chicago, IL — Downtown District Cooling: A 21st Century Approach

Chicago, IL — Role of Municipal Governments in the Design and Implementation of Energy Efficiency Codes and Standards Designed to Capture Lost Efficiency Opportunities

Seattle, WA — Coordination of Energy and Air Quality (CEAM)

St. Louis, MO — Earthways Home Project: An Educational Center for Sustainable Urban Development

Tucson, AZ — Minority Marketing for Resource Conservation

Washington, DC — Energy Auditor Training Course for High School Students

ENERGY EFFICIENT FACILITIES

Activities involving energy efficient facilities are part of a national effort to achieve maximum cost-effective energy productivity in the building sector. New technologies and management/administration practices to advance energy efficiency in facilities require major partnership efforts and transfer programs. Multifamily housing that has a large concentration of low-income families presents a unique challenge to lowering energy costs and maintaining energy efficient facilities. Both existing building stock and near-term new construction need to be made much more energy efficient if we are to meet local, state, and national objectives related to energy security, energy supply, and energy affordability. Space heating and cooling, lighting, water heating, refrigeration, cooking, ventilation, building envelope, energy efficient codes implementation, operation and maintenance (O&M), education, etc. are areas where opportunities exist to improve energy efficiency. The 1992 Energy Efficient Facilities Unit consists of:

Boston, MA — Energy Efficiency Outreach Partnership

Columbus, OH — Integrating Operations and Maintenance (O&M) for Energy Efficiency with O&M for Improving Indoor Air Quality

Hennepin County, MN — Integrated Rehab and Weatherization Program for Low Income Suburban Homeowners

Memphis, TN — Upgrade Energy Building Standards and Develop Rating System for Existing Low-Income Housing

New Orleans, LA — Utilization of Energy Efficiency to Support Homeownership Affordability

Detroit, MI — Energy Optimization of Water Distribution System

Montgomery County, MD — CFC Maintenance and Conversions in Chillers: The Commercial Building Response to the 1990 Clean Air Act

New York City, NY — Development of an Energy Services Corporation

Phoenix, AZ — Solar Cooling Demonstration Project

San Francisco — Energy Management Action Plan (EMAP)

TRANSPORTATION

It is frequently said that the goal of transportation strategies should be moving people, not vehicles. But in the day and age of satellite networks, cellular phones, and personal computers, we can redefine transportation as access to goods, services, and information to meet the needs of local governments and their citizens. Alternative transportation fuels are still a major piece in a very large and complex puzzle facing local governments that includes wide-reaching concerns about transportation. There are many factors related to transportation that affect local governments: increasing congestion, crumbling infrastructure of roads and bridges, unchecked urban/suburban sprawl, and the increased "paving over" of our communities that leads to urban heat islands. Federal, state, and urban governments each share in the responsibility and must play a role in providing a sustainable and multi-faceted transportation system that is based on comprehensive and integrated planning at all levels. The 1992 Transportation unit consists of:

Houston, TX — Public/Private Partnership to Identify Barriers & Provide Solutions to Implement Large Scale Fleet Natural Gas Vehicle Utilization

in Ozone Non-attainment Areas

New York City, NY — Energy and Economic Implications of Transportation Demand Management Strategies

Pittsburgh, PA — Natural Gas Infrastructure Development

Seattle, WA — Telecommuting for City Employees

Albuquerque, NM — A Fully Integrated Multi-Fuels Service Stations

Denver, CO — Technical Comparison Between Hythane (H₂/CNG) and CNG Fueled Vehicles

Las Vegas, NV — Reduction of Diesel Exhaust Emissions in Urban Mass Transit Vehicles with Alcohol Injection Systems

San Diego City, CA — California Clean Air Act - A Compliance Strategy for the City of San Diego's Non-Emergency Fleet

Reports from each of these research projects, including this report, are specifically designed to aid the transfer of proven experience to other local governments. Readers interested in obtaining additional reports or further information about the Urban Consortium Energy Task Force should contact:

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This project was the result of a cooperative effort with several divisions of local government contributing toward its successful completion. It is a sincere pleasure to acknowledge and thank them for their efforts.

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Mr. Dexter Muller, Director of the Memphis/Shelby County Division of Planning and Development and Urban Consortium Energy Task Force member, served as Project Director. Mr. Cliff Norville, Manager of Energy Management under the Division of Planning and Development, served as Project Manager during implementation of this project. Mr. Jeff Reece served as assistant Project Manager and coordinated all major work during the project.

The Memphis Division of Housing and Community Development played a major role in this project so the project staff would like to express special thanks to them. Specific HCD representatives providing assistance were Mr. John Owen, Mr. Andrew Harvey, Ms. Debra Brown, Mr. David Laster and Mr. David Ralston.

Memphis Light, Gas and Water also served as a major partner in the project. MLGW representatives deserving special thanks are Ms. Becky Garland, Ms. Rita Heffner, Ms. Becky Delich, Ms. Becky Williamson, Mr. Eugene Rosser, and Mr. Larry Brown.

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CHAPTER ONE - OVERVIEW

ABSTRACT

The City of Memphis Division of Housing and Community Development (HCD) receives grant funding each year from the U.S. Department of Housing and Urban Development (HUD) to provide local housing assistance to low-income residents. Through the years, HCD has found that many of the program recipients have had difficulty in managing their households, particularly in meeting monthly financial obligations. One of the major operating costs to low-income households is the utility bill. Furthermore, HCD's experience has revealed that many low-income residents are simply unaware of ways to reduce their utility bill.

Most of the HCD funds are distributed to low-income persons as grants or no/low interest loans for the construction or rehabilitation of single-family dwellings. With these funds, HCD builds 80 to 100 new houses and renovates about 500 homes each year. Houses constructed or renovated by HCD must meet HUD's minimum energy efficiency standards. While these minimum standards are more than adequate to meet local building codes, they are not as aggressive as the energy efficiency standards being promoted by the national utility organizations and the home building industry.

Memphis Light, Gas and Water (MLGW), a city-owned

utility, has developed an award-winning program named Comfort Plus which promotes energy efficiency in new residential construction. Under Comfort Plus, MLGW models house plans on computer for a fee and recommends cost-effective alterations which improve the energy efficiency of the house. If the builder agrees to include these recommendations, MLGW will certify the house and guarantee a maximum annual heating/cooling bill for two years. While the Comfort Plus program has received recognition in the new construction market, it does not address the existing housing stock.

Representatives from HCD and MLGW together with the Memphis Division of Planning and Development (DPD) formed a task force to address the utility concerns of the low-income community. The following hypothesis evolved from task force discussions: utility expenses can be reduced to a manageable level if the house is built to be energy efficient and the homeowner practices energy conservation techniques and routine maintenance.

The task force established specific project goals which included: 1) an upgrade of the minimum energy efficiency building standards; 2) a residential energy conservation curriculum for low-income residents participating in housing assistance programs; and 3) development of a local energy efficiency rating system for existing homes.

As a result of this project, twelve houses were built by HCD based on energy efficiency standards recommended by MLGW's Comfort Plus program. A residential energy conservation workshop was also held for a local civic club composed primarily of low-income residents. Finally, MLGW has identified a residential energy analysis software package which evaluates existing housing.

PROJECT PURPOSE

The intent of this project was to assist low-income home owners by recommending policies, enhancing existing programs, and developing new programs that encourage and emphasize residential energy efficiency. DPD sought to achieve this goal through a consortium of federal, state and local agencies sponsoring assistance programs for low-income housing residents.

This project arranged for the construction of 12 new homes by HCD using MLGW's Comfort Plus program guidelines. MLGW modeled each of HCD's standard floor plans with their energy simulation software. MLGW recommended several building improvements which would combine to reduce the projected energy consumption of the new houses by almost 20 percent.

DPD developed a residential energy education workshop for low-income homeowners, specifically participants in HCD's housing program. The workshop described typical energy consumption in the home and focused on conservation techniques relating to heating, air conditioning, lighting, and plumbing.

Memphis has never adopted a home energy rating system (HERS). The project originators believed that the adoption of an HERS would benefit local home owners, home buyers, and home builders by offering assistance in comparing the energy efficiency of new and existing homes. The project assisted MLGW in selecting an HERS for Memphis.

Benefits for local residents included (1) more energy efficient housing, (2) training on energy conservation in the home, and (3) lower utility bills. The city benefitted

from improved communication between local housing agencies and publicity for housing assistance programs.

Other jurisdictions can profit by learning of the problems and pitfalls in this project and perhaps arrive at their own solutions earlier by using Memphis' experience as a guide.

REPORT ORGANIZATION

This report is divided into three main divisions: introductory material, four chapters of text, and an appendix.

The introductory material consists of a preface, an acknowledgments section, and a table of contents.

Chapter 1, entitled "Overview," presents the project abstract and describes how the report is organized.

Chapter 2, entitled "General Background and Description," contains a description of the energy and housing programs offered by the project's partners and background information on home energy rating systems.

Chapter 3, entitled "Project Description," describes the three main components of the project: (1) the HCD-MLGW cooperative effort in constructing energy-efficient housing for low-income persons (2) the development of an energy education curriculum for clients of HCD and other low-income persons and (3) the review and selection of an HERS for Memphis.

Chapter 4, entitled "Summary," notes the problems and

successes of this Energy Task Force (ETF) project and looks to the future by offering recommendations for local agencies on how to encourage energy efficiency in housing. Chapter 4 also offers suggestions on how to apply the lessons learned locally to jurisdictions elsewhere.

The appendix contains the agenda for the energy conservation workshop, the energy workshop workbook, a copy of the request for proposal (RFP) for MLGW's home energy rating system, and other information referenced in the text.

CHAPTER TWO - GENERAL BACKGROUND AND DESCRIPTION

INTRODUCTION

This chapter sets the background for the project and provides brief descriptions of the major agencies, programs, and concepts that form the project's framework.

PROJECT AREA

The project area encompasses the City of Memphis, Tennessee. Memphis is the largest city in Tennessee with a 1990 population of 610,337. Memphis is the county seat of Shelby County which is the largest county in the state with a population of 826,330.

The Memphis Metropolitan Statistical Area (MSA) consists of Shelby, Tipton, and Fayette counties in Tennessee; DeSoto County, Mississippi; and Crittenden County, Arkansas. The 1990 population of the MSA was 1,007,306.

The African-American or black population of Memphis composed 55 percent of the total population in 1990 with European-Americans or white persons composing 44 percent. Twelve percent of Memphis' population in 1990 was aged 65 years and older. Medium household income for Memphis in 1989

(figures taken from the 1990 Census) was \$22,674. Per capita income for Memphis in 1989 was \$11,682. Twenty-three percent of all Memphis residents lived below the poverty level in 1989.

There were 248,573 housing units in Memphis in 1990 with 57,153 units, or 23 percent of the total, constructed before 1950. The median value of specified owner-occupied units in 1990 was \$55,700. The average persons per owner-occupied unit in 1990 was 2.71.

Of the 229,829 occupied housing units in Memphis in 1990, natural gas was the principal heating fuel for 70 percent. Electricity was the choice as the heating fuel for 28 percent of Memphis' houses. The remaining two percent of houses were heated by bottled, tank, or liquefied petroleum gas; wood; fuel oil or kerosene; solar energy; coal or coke; other fuels; or had no heat at all.

The annual average temperature in Memphis is 62°F with a January average of 40°F and a July average of 82°F. The annual average precipitation is 52 inches while the annual average snowfall totals 5.7 inches.

PROJECT PARTNERS AND THEIR PROGRAMS

Memphis Light, Gas, and Water Division

Memphis Light, Gas, and Water is the municipal utility company serving Memphis and most sections of Shelby County. The utility is owned and operated by the City of Memphis. The utility was created in 1939 and today is the largest

three-service public utility in the nation. MLGW serves 363,630 customers with electricity; 265,028 customers with gas; and 212,232 customers with water.

The source of electricity for MLGW is the Tennessee Valley Authority (TVA). Natural gas is provided by the Texas Gas Transmission Corporation and the Trunkline Gas Company. MLGW also buys natural gas wholesale. Fuel oil and liquefied petroleum are available from several local distributors. Memphis receives its water from one of the largest artesian water systems in the world.

MLGW sponsors several programs that encourage and promote energy conservation and efficiency. Among them are:

Comfort Plus Program. The Comfort Plus program provides a plan for new single family homes which incorporates energy efficient building standards, heating and air conditioning equipment sizing, duct design and quality assurance inspections for builders who want to market their homes as certified MLGW Comfort Plus homes.

If a house meets the standards and passes all inspections, it receives the Comfort Plus designation along with a two-year guarantee on the heating and cooling costs. Comfort Plus standards can improve energy efficiency up to 50%. The energy analysis, quality assurance inspections, and two-year guarantee cost the builder \$150 per house.

The builder is provided heating and cooling plans plus all required specifications for each house. Several construction options are offered with their respective guarantees and the builder is free to choose which option he or she prefers. Inspections during and upon completion of

construction must confirm that a house meets all program requirements and are required to receive the program's guarantee.

Home Energy Program. MLGW offers a free home energy survey and provides recommendations for making the home more energy efficient.

To apply the recommendations, the home owner applies for financing through MLGW's revolving loan program. Loans are set at the current interest rate and have a \$1,200 limit per dwelling (\$5,000 per landlord).

Loans are approved for attic insulation, storm windows, or rehabilitation work needed to protect weatherization measures or to stop air infiltration.

The home owner may do the work himself or choose a contractor participating in the program.

Comfort Zone Program. The Comfort Zone program offers customers long-term financing for installing energy-efficient heating and/or cooling systems in existing homes. Loans are available for central air conditioners, central forced air natural gas furnaces, and central heat pumps.

The customer selects the contractor, equipment, financing plan, and bank. Participating banks and lending institutions determine customer loan eligibility. Technicians from MLGW inspect the equipment and installation to ensure the work meets energy and safety standards.

Project MAX. MLGW spearheads this multi-agency group to assist low-income, elderly and handicapped customers. Volunteers in the program help weatherize and repair homes.

Program expenses are paid for by the volunteers and their sponsoring agencies.

Consumer Education Program. MLGW's Consumer Education Department answers inquiries and provides information on the utility's services and energy projects such as appliance efficiency, home lighting, kitchen planning, leased outdoor lights, and safety.

City of Memphis Division of Housing and Community Development

HCD is responsible for a wide range of programs aimed at revitalizing housing and infrastructure in Memphis. Using an annual entitlement grant from the U.S. Department of Housing and Urban Development, HCD sponsors neighborhood revitalization programs to improve housing, streets, drainage systems, and parks in targeted areas. Among its programs are:

Memphis Approach to the Rehabilitation and Conservation of Housing (MARCH). The MARCH program offers financial and construction assistance for home owners within certain designated areas of Memphis. The purpose of the MARCH program is to better local housing by improving it to meet city code standards. Assistance may be in the form of a loan, grant, or a combination loan/grant.

Acquisition, Relocation, and Clearance Program (ARC). Unrehabilitable housing may be acquired by HCD and demolished. The ARC program purchases property from the home owner at fair market value, moves the residents into other suitable housing (or builds a new home), and demolishes the unrehabilitable housing. The resident may opt to build anew on the same site or, in some situations, the land may be

used for local infrastructure improvements such as street or drainage easements.

Other HCD Housing Programs. HCD also provides grants for the emergency home repair of structural problems threatening the safety of residents and a counseling service to help clients maintain housing improvements provided by the MARCH and ARC programs. HCD also operates the Clearance of Abandoned Structures Program which condemns and demolishes blighted structures throughout the city.

Tennessee Energy Division

The Tennessee Energy Division (TED) is a unit of the State of Tennessee Department of Economic and Community Development. TED provides leadership and direction in promoting the efficient and economical use of energy for state and local governments, businesses and industries, schools and hospitals, and residential energy consumers in Tennessee. This is accomplished through grants provided by the U.S. Department of Energy.

Among its many programs, TED sponsors the Local Government Energy Efficiency Grant and Loan Program. This program provides funds to local governments to install energy efficiency improvements in city and county buildings. Improvements include new heating and cooling systems, fluorescent lights, automatic controls, storm windows, and insulation. The grant program provides low-interest loans to local governments for identifying and installing energy efficiency programs.

Conserving energy through the implementation of energy efficiency measures in residences is a major objective of TED. The division offers a toll-free energy hotline and a

newsletter to distribute energy education materials for the residential sector.

Tennessee Valley Authority

The Tennessee Valley Authority was created in 1933 to control flooding on the Tennessee River, furnish dependable water transportation on the Tennessee and its tributaries, and bring low-cost electrical power to the people of the Tennessee Valley Region. TVA today is the major energy supplier for communities in a seven-state region.

TVA's generating plants include hydro, fossil fuel, nuclear, and pumped storage plants. TVA is the major supplier of electricity for MLGW and owns and operates the Allen Steam Plant in Southwest Memphis. The nearest TVA hydroelectric plant to Memphis is Pickwick Dam on the Tennessee River approximately 100 miles east of Memphis.

In the past, TVA has sponsored a wide range of energy conservation services for consumers. However, due to budget cutbacks in recent years, TVA has curtailed this type of activity. With MLGW taking the lead in these activities in Memphis and Shelby County, the Memphis District Office of TVA focuses most of its consumer education services on neighboring counties such as Tipton and Fayette. Most of TVA's activities there consist of financing weatherization programs.

Memphis and Shelby County Energy Management Program

In 1988, Memphis and Shelby County established the Energy Management Section under the Division of Planning and Development (DPD). The section was created to address the rising costs of utilities by promoting the efficient use of

energy in facilities owned by Memphis and Shelby County. The Energy Management Section advises all divisions of local governments of energy conservation opportunities, provides technical assistance to implement energy measures, coordinates energy projects between divisions, and monitors the utility consumption in government facilities after project implementation.

The Energy Management Section conducts walk-through audits and technical energy audits for local government facilities. The section also promotes energy conservation design criteria to guide the construction of new government facilities.

HOME ENERGY RATING SYSTEMS

Computers have been used to model the thermodynamics of buildings for decades. Before the "energy crisis" of the 1970s, computers were mainly used to calculate peak heating and cooling loads for sizing equipment. Energy efficiency was of little concern so software was designed to predict adequate equipment sizes, more so than accurate equipment sizes.

The oil embargo of the 1970s caused the federal government and the public to become more conscious of energy and conservation. The federal government provided leadership by funding numerous conservation programs, including weatherization assistance programs for homeowners. Consultants seized the opportunity to specialize in energy conservation and many were quite successful; but, as the "energy crisis" subsided in the 1980s, most of the energy conservation upstarts abandoned the field due to lack of business.

This conservation movement, however, led to the refinement of building simulation software and building auditing procedures by the federal government's national laboratories and private consultants. Literally hundreds of computer programs were developed which analyzed various aspects of typical building energy consumption. Many of these programs focused on measuring the relative energy efficiency of residential buildings. A few of the organizations which developed these programs have persevered and survived the 1980s' ambivalence toward energy conservation and represent the current market of home energy rating systems (HERS).

HERS measure the relative energy efficiency of any house, regardless of age, efficiency, or fuel use. An overall rating is computed based on the efficiency of the thermal envelope and the heating, ventilation and air conditioning (HVAC) system and is obtained from an on-site inspection and calculations. Calculations include estimates of annual energy performance and costs and recommendations for cost-effective energy efficiency improvements.

Some of the most successful HERS organizations include: 1) the Energy Star program of the City of Austin, Texas; 2) the Energy Rated Homes of America (ERHA) organization whose program has been adopted by almost one dozen states; 3) the Energy Score program of the City of Fort Collins, Colorado. Table 1 offers a comparison of several features of these popular HERS programs. Several other states are beginning HERS programs specially designed to meet their program objectives.

TABLE 1
COMPARISON OF THREE HOME ENERGY RATING SYSTEMS

<u>Feature</u>	<u>Energy Star</u>	<u>ERHA</u>	<u>Energy Score</u>
Rates:			
New Homes	Yes	Yes	Yes
Existing Homes	No	Yes	Yes
Single-Family Homes	Yes	Yes	Yes
Multifamily Homes	No	(Vermont Only)	Yes
Electric-Heated Homes	Yes	Yes	Yes
Gas-Heated Homes	No	Yes	Yes
Rating Tool	Stars (1,2,3)	100 Points (5 Stars/ 10 Levels)	100 Points
Incorporates Weather	Yes	Yes	Yes
Tied to Energy Efficient Mortgage	No	No	(Offers ZILCH Program)

In addition to HERS, hundreds of utility companies offer energy efficiency certification programs. These certification programs focus on new residential construction and require participants to build houses which meet energy construction standards higher than the local building codes. The "Good Cents" and "Super Good Cents" certification programs are probably the most popular.

The proliferation of residential energy rating software over the past two decades has resulted in a lack of standardization in the calculation methods and rating criteria of HERS. Most HERS are simplified microcomputer-based versions of complex building energy analysis simulation (BEAS) programs. With no standard guidelines to follow, each software designer based his/her program on the algorithms with which he/she was most confident. The national laboratories, especially the National Renewable Energy Laboratory (NREL), have done extensive work in evaluating the accuracy of both the complex BEAS and HERS and have found significant diversity in their energy predictions. This diversity has affected the credibility of HERS and has limited public acceptance.

One of the goals of the National Energy Strategy, developed under the Bush Administration, is to establish reliable methods for rating the energy performance of residential buildings. The U.S. Department of Energy (DOE), in cooperation with the U.S. Department of Housing and Urban Development (HUD), has responded by forming the National Collaborative on Home Energy Rating Systems and Mortgage Incentives for Energy Efficiency.

The National Collaborative convened for the first time in March 1991 and was composed of representatives from housing, mortgage financing, and energy supply industries. The mission of the National Collaborative was to reach a consensus on a voluntary national program that will link credible home energy rating systems with mortgage incentives for energy-efficient housing.

The work of this collaborative is establishing the foundation for HERS to be adopted nationwide. The recommendations of the collaborative are reinforced by the National Energy Security Act of 1992 which requires DOE to

encourage local residential energy rating systems based on voluntary standards.

ENERGY CODES

Tennessee Energy Code (TEC)

Memphis and Shelby County operate under the official state energy code for Tennessee, the "Tennessee Code for Energy Conservation in New Building Construction." The state energy code was adopted in 1977 and governs all municipalities in Tennessee. The adoption and enforcement of the code is mandatory. However, compliance with the code varies from municipality to municipality.

The state code applies to the construction of all new buildings in Tennessee with the exception of manufactured housing (mobile homes). However, the thermal performance criteria in the state code are now considered to be inferior to other current standards.

Department of Housing and Urban Development Minimum Property Standards (MPS)

The latest edition of the Department of Housing and Urban Development Minimum Property Standards for Housing was approved in 1986. The MPS functions as the minimum construction standard for housing under HUD/FHA mortgage loan programs. The MPS is applicable to all new, one- and two-family dwellings except manufactured housing and low-rise, multifamily housing.

Recent changes to the MPS have dropped specific construction criteria and recommend the use of private sector model codes instead. However, specific thermal performance requirements are still contained in the MPS.

Council of American Building Officials (CABO) Model Energy Code (MEC)

The Model Energy Code was developed by the Council of American Building Officials with the latest edition being issued in 1992. CABO is a national trade association for practicing building officials and inspectors from three regional model code organizations.

The MEC applies to all new buildings except manufactured housing. In 1992, Indiana became the first state to adopt the new MEC.

For purposes of comparison, Table 2 lists several thermal performance standards recommended by the TEC and the MEC.

Cranston-Gonzalez National Affordable Housing Act of 1990

This act directs the Secretary of HUD to establish new energy standards for the construction of all new housing (other than manufactured housing) in the U.S. The act directs that thermal performance standards must meet or exceed the criteria of the Model Energy Code.

TABLE 2
THERMAL PERFORMANCE STANDARDS

	<u>TEC</u>	<u>MEC</u>
Flat Ceiling	R-19	R-30
Vaulted Ceiling	R-11	R-30
Exterior Doors	Solid Wood/ No Storm	Foam Core Steel
Exterior Wall Insulation	R-7	R-13
Exterior Wall Sheathing	Thermoply	Blackboard
Floor Slab	R-3.25	R-5
Floor Over Garage	R-7	R-19
Duct Insulation	R-5	R-5.5
Windows	Single Glass/ Aluminum Frame	Double Glass/ Wood Frame

CHAPTER THREE - PROJECT DESCRIPTION

INTRODUCTION

Prior to submitting the project's proposal to the Urban Consortium, informal discussions between officials of DPD, MLGW, HCD, and TED were held concerning the effectiveness of area housing assistance programs. These discussions revealed a need for improved interaction between local agencies which provide assistance to the low-income community. DPD focused on this need in formulating a project that would encourage active participation from all four agencies and promote inter-agency cooperation through the sharing of information, ideas, and resources.

A Residential Energy Advisory Committee (REAC) was formed from representatives of DPD, MLGW, HCD, and TED. The REAC met in September 1991 to officially discuss the project and define specific goals. MLGW heralded the success of their Comfort Plus program and the fact that in two years none of the Comfort Plus utility bills had exceeded their guarantees. HCD related their experience with customers who repeatedly had difficulty managing monthly expenses, especially utility bills. Both HCD and MLGW shared stories of visits to customers' homes and finding the gas oven being used to heat the home, windows open when the air conditioning was running, etc. The REAC members summarized their experiences with the following two observations.

1. Comfort Plus homes are built to be energy efficient and have proven to have lower utility bills than comparable houses built with conventional construction methods.
2. Most homeowners do not observe energy conservation techniques in the home.

From these observations, the REAC proposed the following hypothesis:

- * Utility expenses can be reduced to a manageable level if the house is built to be energy efficient and the homeowner practices energy conservation techniques and routine home maintenance.

Project tasks and goals were based on this premise. REAC members also agreed at the first meeting that committee membership be expanded to include representatives of other local and state agencies involved with energy and housing. Committee expansion included representatives from such agencies as the Oak Ridge National Laboratory, U.S. Department of Housing and Urban Development, the Tennessee Valley Authority, Home Builders Associations of Memphis and Tennessee, Tennessee Housing and Development Agency, Memphis Area Association of Realtors, and various local agencies and firms concerned with housing and community development issues. A complete list of all members of the committee and the agencies or companies represented is included in Appendix A of this document.

DEVELOPMENT OF THE PROJECT

The REAC was divided into several subcommittees to facilitate the development of specific elements of the project.

Residential Energy Advisory Committee Organizational Structure

Housing Assessment and Construction Committee

The objective of this committee was to quantify the potential energy and cost savings available by upgrading residential energy construction standards. Specific tasks were defined to accomplish the objective.

1. Select a control group of HCD and Comfort Plus houses.
2. Monitor the energy consumption and costs for the control group.
3. Review HCD construction techniques and recommend improvements.
4. Record pertinent data during HCD construction of model homes incorporating Comfort Plus improvements.

5. Track energy consumption and costs of new model homes and compare to preliminary estimates.
6. Project savings potential to housing industry.

This section describes the accomplishments of this committee during the grant period.

Evaluation of Existing HCD and Comfort Plus Housing Stock. To document the impact of changes in construction techniques, research was conducted on houses built according to existing HCD standards and Comfort Plus standards during previous years. HCD provided a list of 78 newly-built homes which were occupied throughout calendar year 1991. MLGW provided a list of 73 Comfort Plus homes.

DPD obtained utility data for 1991 from MLGW for each house. This data was analyzed to determine the baseload energy consumption as well as the cooling and heating energy consumption. All houses were heated by natural gas. All of the Comfort Plus houses were air conditioned by split DX systems. The HCD houses were built to accommodate window air conditioning units, but the units were not provided with the home. (Since the owner was responsible for providing the air conditioner, several of the homes in the sample list had no air conditioning.) Domestic hot water heaters were fueled by either electricity or natural gas.

The housing data was segregated into tables based on construction standards. Energy consumption was calculated per square foot of area for each house. The data from each table was graphed to visually display significant differences in consumption patterns. The data tables and graphs are included in Appendix B.

Table 3 summarizes the 1991 utility cost data for HCD and Comfort Plus homes based on dollars per square foot per

year. This table verifies the efficient performance that the Comfort Plus homeowners enjoy over the HCD homeowners. The efficiency improvements are specifically evident in the heating and cooling costs.

TABLE 3
1991 UTILITY COSTS FOR HCD AND COMFORT PLUS HOMES

	Baseload	Cooling/ Heating	Total
	<u>\$/sqft/yr</u>	<u>\$/sqft/yr</u>	<u>\$/sqft/yr</u>
Comfort Plus w/ Gas DHW:			
Electricity Cost	0.32	0.16	0.48
Natural Gas Cost	0.09	0.12	0.21
Total Energy Cost	0.41	0.28	0.69
Comfort Plus w/ Elec DHW:			
Electricity Cost	0.53	0.16	0.69
Natural Gas Cost	0.04	0.12	0.16
Total Energy Cost	0.57	0.28	0.85
HCD w/ A/C:			
Electricity Cost	0.34	0.19	0.53
Natural Gas Cost	0.19	0.17	0.36
Total Energy Cost	0.53	0.36	0.89
HCD w/o A/C:			
Electricity Cost	0.22	0.00	0.22
Natural Gas Cost	0.19	0.17	0.36
Total Energy Cost	0.41	0.17	0.58

A telephone survey was made of each HCD and Comfort Plus home to further clarify the utility data. The survey

questionnaire noted the number of people in the household, the gender and age of household members, the number of residents home during the day, and the time at that address. The telephone survey received limited success with 80% of HCD households responding while only 60% of the Comfort Plus households responded.

Table 4 presents the information gathered from the telephone survey. The information verifies that the Comfort Plus homes have lower utility bills than do the HCD homes regardless of the number of occupants or their ages. Another interesting observation suggests that senior adults are more energy conscious than children and youth.

Comfort Plus Program Analysis of HCD Housing Plans.
MLGW agreed to run a Comfort Plus analysis on the typical floor plans used by HCD in their relocation program. HCD, however, could not afford to pay the \$150 analysis and inspection fee for every house built. MLGW agreed to waive the analysis fee, but MLGW would not guarantee the heating and cooling bills and made fewer inspections of the houses during construction.

The technicians recommended that Comfort Plus standards be incorporated in a limited number of HCD homes to be constructed in 1992 to serve as a demonstration group. Table 5 presents a comparison of typical HCD and Comfort Plus thermal performance standards.

In February 1992, the four standard floor plans used by HCD were sent to MLGW's Comfort Plus program technicians for review. The technicians examined the plans and determined that Comfort Plus features could be added to HCD's housing plans for little extra cost per dwelling--less than \$500 per

TABLE 4
1991 UTILITY COSTS FOR HCD AND COMFORT PLUS HOMES
OCCUPANCY CORRELATION

<u>Number of Occupants</u>	<u>Total \$/sqft/yr</u>
Comfort Plus w/Gas DHW & 1-2 Occupants:	0.73
Comfort Plus w/Gas DHW & 3-5 Occupants:	0.71
Comfort Plus w/Elec DHW & 1-2 Occupants:	0.80
Comfort Plus w/Elec DHW & 3-5 Occupants:	0.92
HCD w/ A/C & 1-2 Occupants:	0.84
HCD w/ A/C & 3-5 Occupants:	1.12
<u>Occupant Age Groups</u>	
Comfort Plus w/Child Occupants:	0.81
Comfort Plus w/Senior Adult Occupants:	0.74
HCD w/ A/C & Child Occupants:	1.15
HCD w/ A/C & Senior Adult Occupants:	0.82

TABLE 5
HCD/COMFORT PLUS THERMAL PERFORMANCE PACKAGE COMPARISON

	<u>HCD</u>	<u>Comfort Plus</u>
Floor Slab	R-0	R-5
Exterior Wall	R-14	R-14
Flat Ceiling	R-24	R-30
Caulking	None	Plates, Wiring Holes, Windows, Doors
Vapor Barrier	None	Air/Vapor Barrier

house. The energy savings on utility bills per house were estimated to be 19 percent over the course of a year. (See Table 6.)

Construction of New Homes to Comfort Plus Standards. In March, HCD officials agreed to construct 12 new homes to Comfort Plus standards. The homes were located in various parts of the Memphis inner-city area: four homes were located in Southwest Memphis, four homes in Midtown Memphis, four homes in North Memphis. (See Figure 1.) All of these houses had three bedrooms and a floor area of 1,040 square feet.

HCD first held a series of meetings with its contractors to encourage them to incorporate Comfort Plus standards in their construction. The contractors expressed concerns that changes in the construction standards might add substantial cost and time delays to house construction. They felt that the flexibility contractors currently have in utilizing various combinations of building materials was threatened. MLGW Comfort Plus technicians countered their argument with stories of other contractors who had successfully implemented Comfort Plus recommendations. In the end, HCD and MLGW permitted several variances in construction materials and methods which still maintained the thermal performance criteria.

This lengthy discussion phase delayed the beginning of construction until August 1992. Construction was completed on the last of the homes in December 1992.

TABLE 6
COMFORT PLUS ANALYSIS OF HCD HOUSING PLANS

	<u>HCD</u>	<u>Comfort Plus</u>
Energy Performance:*		
Design Heating Load:	45,000 BTUH	32,570 BTUH
Design Cooling Load:	23,371 BTUH	20,259 BTUH
Energy Costs:		
Average Monthly Costs for Heating and Cooling:	\$47.33	\$38.25
Percent Reduction: 19%		
Implementation Costs:		
Slab Insulation	\$100	
Ceiling Insulation	50	
Caulking	100	
Vapor Barrier	<u>150</u>	
Total	\$400	

* Figures are based on a furnace efficiency rating (AFUE) of 78 percent and an air conditioning efficiency rating (SEER) of 10.0 for a three-bedroom house of 1,040 square feet.

Energy Assessment of New HCD-Comfort Plus Homes.
Because the new HCD-Comfort Plus homes were constructed during the latter part of 1992, very limited utility usage

FIGURE 1:
Locations of HCD /
Comfort Plus Homes

information could be abstracted in 1992. Current plans are to abstract utility usage data for the homes for the 12 months of 1993.

Education and Marketing Committee

Discussions between officials of DPD and HCD revealed that many of HCD's clients, mostly first-time homeowners, had recurring problems in dealing with such home ownership responsibilities as budgeting and home maintenance. HCD had planned to develop an outreach program, known as the Housing Counseling Center, to teach their recipients home management skills. Several areas of instruction were being considered for inclusion in the counseling program, such as budgeting, home maintenance and repairs, and home energy conservation and efficiency.

The Education and Marketing Committee was challenged to develop the home energy conservation portion of the program for HCD under the auspices of the Urban Consortium grant.

Development of Workshop Format. The Education and Marketing Committee decided that a workshop format would be most effective in presenting the energy conservation information. The following precepts guided the development of the workshop:

1. The workshop would be designed specifically for HCD clients.
2. Most, if not all, of the attendees would be low-income, elderly persons with modest educational backgrounds.
3. Attendance at each workshop would be limited to approximately 20 to 25 persons.
4. Each workshop would be no more than two hours in length.

5. The workshops would consist of a video presentation, a lecture period, and a period for demonstrations with participatory activities.
6. The workshops would be developed for presentation at a single, permanent location or as a mobile workshop which could be moved to various meeting sites such as community centers, schools, or churches.

Video Presentation. The project staff had originally planned to produce a local videotape program on energy conservation for use in the workshop and anticipated that the video would also be made available to the Memphis area public for use in the consumer education programs of MLGW and TVA.

The Memphis video was to be a "how-to" program demonstrating the relative ease and simplicity with which homeowners could implement energy efficiency measures. This was to be accomplished by showing a variety of "real" people (both genders, various ethnic backgrounds, young and old, etc.) implementing the measures.

A number of older videotapes (mostly produced in the 1970s and early 1980s) were acquired and reviewed in an effort to gather ideas for the Memphis-produced video. (A list of sources for videos on energy and energy conservation is included in Appendix C of this report.)

The production of the video was budgeted for \$7,500 in project funds. Local video production costs were estimated to be approximately \$1,000 per finished minute. The project manager believed that, at the least, a 15-to-20-minute video was needed to adequately convey the message. However, with the project's video production budget limited to \$7,500, a 15-to-20-minute video would not be possible without additional funds being secured.

The Education and Marketing Committee held a number of discussions regarding this problem and several ideas for additional funding sources were suggested. However, no one in a position of authority from any of the participating agencies was willing to commit to providing additional funds, so this effort failed.

At the Energy Task Force unit meeting in April, unit members indicated that a videotape on energy conservation had been recently produced by the Energy Office of the City of Portland, Oregon. The project staff acquired the video entitled "Ten Quick Ways to Cut Your Energy Bill" and presented it to the Education and Marketing Committee. The committee members agreed that the Portland video would be adequate for use in the HCD workshops and decided to abandon the plan to produce a Memphis video.

Since the video was produced in Portland, certain information emphasized in the video was specific to the Pacific Northwest. These discrepancies were clarified by the workshop speaker following the video presentation. The discrepancies were as follows.

1. Fuel oil is a common heating fuel in the Pacific Northwest, while it is rarely used in Memphis.
2. Conservation measures pertaining to air conditioning were not mentioned in the video. Air conditioning accounts for a major portion of energy consumption in Memphis.
3. The video used an example to illustrate the relative costs of lighting, heating, domestic hot water, and appliances out of each dollar spent on utilities. The relative percentages for the Memphis area are quite different.

MLGW representatives also suggested that two conservation tips recommended in the video be accompanied by a disclaimer as follows.

1. The video demonstrated the installation of adhesive-backed vinyl weatherstripping on exterior doors. MLGW experience shows that adhesive-backed weatherstripping tears up too easily. They recommended weatherstripping mounted on an aluminum frame which is attached to the door facing with screws.
2. The video also suggested the use of lightweight plastic storm windows which is designed to form to the shape of the window with the application of heat. MLGW suggested that these may be a health hazard in homes with small children who might remove the plastic from the windows, become entangled, and suffocate.

The Portland video was incorporated into the workshop presentation with the above-mentioned clarifications.

Workshop Lecture. Because the Urban Consortium grant was for one year only, the project manager had intended that a speaker from MLGW, TVA, or HCD would lead the workshops to ensure continuity in the program after DPD's participation ended. However, no personnel from these agencies were available to lead the workshop, so alternative plans were considered. The hiring of a professional speaker was considered as well as arranging to have a senior citizen volunteer serve as workshop facilitator. However, to eliminate the costs of hiring a speaker and to better ensure direction for the project, the project manager decided that he would lead the workshops with assistance provided by an energy technician from MLGW's Consumer Education Department. A script for the workshop's lecture portion was prepared. The agenda for the workshop is included in Appendix D.

Development of Workshop Materials. A workbook, entitled Energy Conservation Workbook: Helpful Hints to Lower Your Utility Bill, was developed for workshop participants to provide assistance in following the lecture portion of the program and to offer a source of information for future reference. Initially, a workbook produced specifically for this project was planned. However, MLGW and TVA had jointly prepared a series of consumer information cards that did an excellent job of conveying the type of information aimed at workshop participants. Copies of the information cards were acquired and the cards were bound in a wire-ring binder for workshop participants. A copy of the workbook appears in Appendix E.

The binder was fitted with a back flap to hold pamphlets that offered additional information to that contained in the information sheets. Dozens of brochures were obtained from TVA, the Department of Energy, the Department of Agriculture, MLGW, and other public utility companies. The brochures were reviewed to choose the ones offering appropriate messages for the workshop audience. Several brochures produced and/or distributed by MLGW were selected for inclusion: a consumer's handbook for MLGW's customers, a pamphlet designed specially for senior citizens, a "how-to" brochure on caulking windows, and a pamphlet discussing portable heaters.

Transparencies were made to depict typical residential energy usage in Memphis. A facsimile of MLGW's standard residential utility bill was included to demonstrate to participants how to read their bills.

Workshop Demonstrations. Several demonstration props were constructed by DPD or acquired from MLGW for the demonstration/activities portion of the workshop. The props consisted of:

1. a caulk board for practicing caulking techniques;
2. a wood-frame window for practicing reglazing of cracked window panes;
3. a door and door frame for weatherstripping the frame and threshold;
4. an electrical outlet and light switch for installing gasket sealers;
5. a window air conditioner to demonstrate how to change air conditioner filters;
6. a lavatory basin to demonstrate how to change faucet washers;
7. a shower head to demonstrate how to replace an old shower head with an energy-efficient flow restrictor; and,
8. a "meter board" with movable hands to demonstrate the reading of electric, gas, and water meters.

Residential Energy Conservation Kits. Kits containing 19 energy conservation items were distributed to each workshop participant. The items in the kits were purchased with funds from the Urban Consortium grant. A list noting each item in the kit, its features, and cost is presented in Table 7.

The members of the Education and Marketing Committee first proposed that committee members solicit various manufacturers, wholesalers, and retailers for donations for the kits. However, few offers of donations were forthcoming and the project manager decided that the items for the kits should be purchased. (Door weatherstripping and plastic bags for packaging the kits' items were donated by MLGW.)

By distributing the kits and instructing the workshop participants in how to install the items, the project staff hoped that this would encourage the participants to actually use the items. This was seen as preferable to simply

describing what items should be purchased and giving general directions for installation.

TABLE 7
ENERGY CONSERVATION KIT CONTENTS

<u>Item</u>	<u>Brand</u>	<u>Unit Cost</u>
Acrylic Latex Plus Silicone Caulk	DAP	\$1.59
Caulk Gun	Newborn	2.07
Putty Knife	Red Devil	3.08
Latex Window Glazing	DAP	2.14
Window Points	Easy	0.34
Duct Tape	Tough Stuff	3.60
Aluminum and Vinyl Door Sweep	Pemko	2.34
Electrical Outlet Cover Gaskets	Pemko	2.83
Window Air Conditioner Cover	Dennis	4.85
Window Air Conditioner Foam Seal	Dennis	1.75
Polyurethane Air Conditioner Filter	AAF	0.88
Compact Fluorescent Lamp and Ballast	Lifelite	9.88
Low Flow Shower Head	CS	4.40
Faucet Aerator	CS	1.33
Plastic Clothesline	Secure	1.50
Clothes Pins	Forster	2.63
Dust Masks	3M	2.24
Safety Goggles	Estwing	2.55
Total Kit Cost		\$50.00

Workshops Held. A "trial-run" demonstration workshop was held for various energy and housing officials from across Tennessee on December 3, 1992. This was designed to

serve as a practice workshop before actually presenting the information to HCD's clients. The demonstration workshop, entitled the "Pride of Ownership Workshop," was cosponsored by TED, MLGW, and DPD and was held at MLGW's training center facility in East Memphis. Nine persons attended the workshop. They included representatives of utility and energy agencies in Memphis, Nashville, and Gibson County, Tennessee.

The first workshop for HCD clients was held December 18, 1992. The program was presented to the members of the Boxtown Community Club and was held at White's Chapel Elementary School in the Boxtown community. Boxtown is located in Southwest Memphis and is a lower-income, African-American community that has retained a primarily rural ambiance despite having been annexed by the city. Although the workshop was originally designed for HCD clients only, HCD officials requested that the workshop be open to all members of the civic club--not just those who had been clients of HCD and whose homes had been built or renovated under HCD's housing program.

Attendance at the meeting was small (seven persons), perhaps due to its scheduling prior to Christmas, and the club officers asked the workshop leaders to return on January 14, 1993, to present a second workshop. The second workshop attracted a much larger turnout--40 people--and was deemed a success by both organizers and participants.

Standards/Rating System Committee

The primary concern of this committee was the construction codes governing the local housing agencies and homebuilders. The formation of this committee coincided with a lobbying effort in the state legislature to upgrade the Tennessee

Code for Energy Conservation in New Building Construction which was originally adopted in 1977. The objective of the Standards/Rating System Committee was to recommend an updated residential construction code and a residential energy rating system to be adopted statewide. The following were specific committee tasks.

1. Review present construction codes and legislation.
2. Review model energy codes.
3. Make recommendations to local and state officials concerning new codes.
4. Review residential energy rating systems currently in use across the country.
5. Define local objectives and requirements.
6. Recommend rating system for local adoption.

The following sections describe the activity of this committee.

Revision of the Tennessee Energy Code. When this project was first discussed, officials with the Tennessee Energy Division were planning to initiate an effort in the Tennessee General Assembly in 1992 to update and strengthen the current state energy code for Tennessee. As a part of this project, recommendations on changes to the code were to be developed that represented a consensus of opinion from the members of the REAC.

However, the effort in the legislature to update the code in 1992 was postponed and preparing the list of recommendations was removed as a priority of the project.

The project staff wanted still to gain a sampling of the opinions of energy and housing associates in Tennessee regarding changes in the code. In March 1992, the staff sent a comparison of three energy codes to members of the

project's Standards/Rating Committee for comment. The three codes were: (1) Tennessee Code for Energy Conservation in New Building Construction (the current Tennessee energy code) (2) the U.S. Department of Housing and Urban Development Minimum Property Standards for Housing (1984 edition), and (3) the Council of American Building Officials Model Energy Code (1992 edition). The staff asked the members of the Standards/Rating Committee to review the three codes and recommend revisions to the state energy code.

However, no comments were received from committee members and the project manager decided that a survey form should be prepared that compared the three codes and would ask the respondents to comment. The survey format was viewed as reducing the amount of time it would take committee members to compare the three codes, thereby encouraging them to respond.

The survey was mailed to the ten members of the committee in October 1992 and four responses were received within the following two months. The survey form and a summary of the responses received appears in Appendix F.

If the Tennessee General Assembly decides to address the updating of the Tennessee Energy Code during its 1993 legislative session, a summary of responses to the form will be sent to officials with the Tennessee Energy Division who will coordinate the effort.

HERS Review. As part of its scope, the Standards/Rating System Committee offered to assist MLGW in the selection of an HERS. DPD participated in the selection process by researching various HERS marketed nationwide, forwarding information to the MLGW selection committee, and attending meetings related to the selection.

In researching these HERS, DPD found variety in the popular software packages. The hardware requirements were different among programs. The software sometimes limited what could be rated, where it could be rated, and how it was rated. The ratings themselves could be numbers, symbols, or a combination of both. Some packages offered training programs for raters, while others did not.

In comparing these HERS programs, the DPD staff realized the significance of the potential owner of the software and his motive for purchase. For example, HERS owners could range from a state or local government to a utility company to a private consultant. Each entity would have a different perspective on the housing industry and orient the utilization of the software to accomplish his goals.

In summary, an "HERS Selection Guidelines," based upon Memphis' experience in selecting an HERS, is presented in Appendix G to assist those decision-makers considering an HERS for their own communities.

MLGW Energy Analysis Software Selection. Before this project began, MLGW was considering the purchase of residential energy analysis software to enhance their residential customer service program. MLGW was not consumed with the necessity of attaching a rating number or code to each house. They were primarily interested in offering assistance to customers with complaints of high utility bills. MLGW resolved that an accurate auditing software package which recommended cost-effective energy improvements was the best approach. MLGW considered any capability of an auditing software package to compute a rating an added advantage.

MLGW already had established a number of requirements for choosing a software package. The requirements were:

1. The system should be a residential auditing system using a personal computer.
2. The system should have rating capabilities.
3. The system should be capable of being operated on a lap-top computer in the field.
4. The program should simulate actual energy consumption and costs.
5. The program should incorporate actual utility usage history into its analysis.
6. The program should incorporate weather data into its analysis.
7. The program should calculate the economics of conservation measures.
8. The program should be able to prioritize conservation measures in report form.
9. The program should be able to produce reports that were simple and easily understood by the customer.
10. The software should be compatible with MLGW's existing software (Lotus and D-Base).
11. The company producing the software should have a proven record in the field.
12. The program should model all three fuel sources simultaneously.

MLGW distributed a request for proposals (RFP) to fifteen firms in June 1992. (A copy of the RFP and a list of the firms receiving it are included in Appendix H). MLGW had earlier surveyed the HERS field and decided to contact only those firms that offered demand side management packages on a per-job basis. The RFP was not distributed to companies marketing energy rating software. Only one company--Synergic Resources Corporation (SRC) of Brookfield, Wisconsin--responded with a proposal that met all of MLGW's requirements.

CHAPTER FOUR - SUMMARY

LESSONS LEARNED

Problems

Construction of HCD-Comfort Plus Homes Began Later Than Expected. When this project was first discussed, the project staff believed that the construction of HCD homes to Comfort Plus standards would be agreed to quickly and that actual construction would be completed before the end of Fiscal Year 1992. This schedule would have allowed the project staff to accumulate sufficient data on energy usage for the new homes for comparison with similar HCD homes constructed to the customary standards.

HCD officials agreed to construct their program's homes to Comfort Plus standards in March 1992. A series of meetings between HCD officials and the agency's contractors was then needed to inform the contractors of the specifics of the HCD-Comfort Plus program. Construction of the first of the HCD-Comfort Plus homes did not begin until August 1992 and construction on the last of the homes did not conclude until December 1992.

This delay in the schedule made it impossible to gather enough data on 1992 energy usage in the new homes to serve

as a comparison with energy usage from previously built HCD homes.

HCD Slow to Commit to Participating in Energy Education Workshop. Initial discussions with HCD had led the project staff to believe that HCD was ready to begin developing its Housing Counseling Center in February 1992. The project staff anticipated having the energy education workshop developed and operating in July 1992. The project staff had planned to offer six monthly workshops to HCD's clients--serving as many as 125 clients by the end of 1992.

However, due to a resetting of the agency's priorities, HCD officials did not commit to participating as a cosponsor of the workshops until October 1992. In the October meeting, HCD officials asked the project staff to organize two workshops for their clients--one for the residents of the Boxtown area in Southwest Memphis and one for the residents of the Smokey City area in North Memphis.

It was agreed that approximately 25 former HCD clients would be invited to attend each workshop and 50 energy conservation kits were purchased for the participants.

However, after the kits were purchased, HCD officials asked that the Boxtown meeting be opened to all members of the Boxtown Community Club--not just former clients of HCD. Thirty-nine energy conservation kits were distributed at the two workshops held for Boxtown residents thus reducing the number of kits available for Smokey City residents from 25 to 11. HCD officials did not attend either of the Boxtown workshops and gave no indication that they wanted to proceed with the Smokey City workshop.

Portland Video Not Entirely Suitable for Memphis. The decision to use the energy conservation videotape produced

by the Portland, Oregon, Energy Office was made at the June 1992 meeting of the project's Education and Marketing Committee. Although members of the committee expressed some reservations about using the video, it was believed that enough of the video's information would apply to Memphis residents to make it worthwhile.

The chief problem with the video is that it does not mention any energy conservation measures for the summer cooling season. Memphis has long, hot, humid summers and anyone viewing a video on energy efficiency for the Memphis area would naturally expect to receive information concerning the cooling season.

The workshop's speaker handled this situation by mentioning several techniques recommended to reduce the summertime energy bill. The workbook used in the workshop also included an information page on cooling tips.

Another problem with the Portland video is that it makes several references to heating oil as a source of heat. The use of heating oil in Memphis residences is virtually nonexistent. The workshop's speaker noted this in his remarks.

The video also includes information on energy costs for a typical utility bill, presumably in Portland or the Northwest U.S., and the percentages of the bill typically spent in several energy cost categories. These figures differ considerably from typical energy costs in Memphis and the Mid-South. This problem was solved by presenting a "pie chart" on an overhead projector that noted energy cost figures for the Memphis area.

Other smaller problems with the video included a recommendation that plastic storm windows be hung on the

inside window frame. Officials with MLGW believe that plastic hung in this manner could present a safety hazard--especially in homes with young children--and do not recommend using plastic insulation inside. MLGW officials also do not recommend using weatherstripping with adhesive backing as is recommended in the video. The adhesive backing often fails to keep the weatherstripping in place and MLGW recommends using weatherstripping with metal backing that screws into the door frame instead.

Revision of the Tennessee Energy Code Delayed. The Tennessee Energy Division had anticipated that the Tennessee General Assembly would take up the issue of revising the state's energy code during 1992. However, proponents of the change decided to postpone the effort until a later legislative session. Thus, the project's plan to be instrumental in developing the standards for the new code did not materialize.

HERS Selection Process Limited by MLGW. The project staff had anticipated that MLGW would be sending its request for proposals for the HERS to many of the firms that now market an HERS package and would be inviting a number of those firms to Memphis for demonstrations. However, MLGW, at the outset of its selection process, limited consideration to only those firms offering demand side management that would develop the HERS package on a per-job basis. MLGW distributed the RFP to 15 firms. Only one firm was able to meet MLGW's requirements.

HERS Purchase Delayed Indefinitely. The project originators had hoped that an HERS for Memphis could be selected, installed, tested, and operating before the end of 1992 so that an assessment of the program could be included

in this report. However, due to budget restrictions, MLGW was not able to buy the HERS package before the end of 1992 and has not yet specified a purchase date.

Successes

Construction of Twelve HCD Homes to Comfort Plus Program Standards. The project staff was instrumental in negotiating an agreement between HCD and MLGW to construct 12 HCD homes to Comfort Plus program standards. Until this project, HCD and MLGW had not considered joining forces to construct more energy-efficient homes for HCD's low-income clients. Constructing the HCD homes to Comfort Plus specifications cost only an additional \$1,500 per home. Construction was completed on the 12 homes in December 1992.

Workshop Materials Developed. The project's staff developed a helpful, informative workbook to accompany the lecture portion of the workshop. This workbook will continue to serve workshop participants as a ready reference source for energy efficient measures to employ in the home. In December, MLGW asked for and received 30 extra copies of the workbook for distribution at a consumer education program at the Orange Mound Community Center in Memphis. The remaining copies of the workbook will be given to HCD for use in their Housing Counseling Center.

The project's staff also developed a series of props for use in the demonstration/activities portion of the workshop. The props allowed the workshop participants the opportunity to have a "hands-on" experience in applying the energy-saving techniques described in the workshop. The props will be donated to HCD for use in the Housing Counseling Center program.

Energy Conservation Kits Popular with Workshop Participants. The energy conservation kits distributed to workshop participants were very popular. Many of the attendees were very appreciative and assured the workshop organizers that the items would be used. Buying the items and distributing them at the workshop was seen as a more effective method of ensuring the installation of energy-saving items rather than simply recommending that the workshop participants buy the items themselves. Since many of the workshop participants are low-income, it is very likely that some could not have afforded to buy the items in the kits and the energy-saving measures would not have been implemented.

MLGW To Use the Portland Video in its Consumer Education Programs. Officials of MLGW were impressed with the quality and message of the energy conservation video produced by the Portland Energy Office and have purchased the videotape for use in community outreach programs of MLGW's Consumer Education Department. MLGW is now discussing with officials of the Portland Energy Office the feasibility of dubbing the videotape to eliminate references to fuel oil as an energy source for Memphians and add references to energy-saving techniques for the summer cooling season.

RECOMMENDATIONS AND SUGGESTIONS FOR APPLICATION

* Construct All New HCD Homes to Comfort Plus Program Standards. It is recommended that HCD construct all new homes in its housing programs to Comfort Plus program standards. Although comparisons between the utility bills for HCD homes constructed to customary energy standards versus utility bills for the new HCD-Comfort Plus homes are

not yet available, it is anticipated that the new HCD-Comfort Plus homes will be more energy efficient. This is viewed as a great assist for many HCD home owners who traditionally have had difficulty paying their monthly utility bills.

* HCD Should Include an Energy Conservation Segment in its Proposed Housing Counseling Center. HCD has plans to create a Housing Counseling Center to assist its clients in improving their home management skills. It is recommended that HCD include a segment on energy conservation as a part of the center. It is recommended that HCD call upon the staffs of MLGW's Consumer Education Department and DPD's Energy Management Section in implementing the energy conservation program.

* HCD Should Establish a Permanent Site for its Housing Counseling Center. It is recommended that HCD select a permanent location for its Housing Counseling Center as opposed to making the counseling center a mobile program designed for presentations at community centers, schools, churches, etc. The project staff found that it was difficult to move the props used in the demonstration portion of the energy workshop because of their weight and size. Also, such items as VCR players and overhead projectors may not always be available for workshop leaders at the site. And, the "borrowed" space at a school or church may not always be of a proper size and condition to be comfortable for program attendees--many of whom are likely to be elderly.

It is recommended that a workshop room be designated in a building owned or leased by the city as a permanent location for the center with all demonstration props already assembled and ready for use.

* Energy Conservation Kits Should be a Part of the HCD Center's Program. Because the energy conservation kits were such a success at the HCD workshops, it is recommended that HCD set aside funds to buy energy conservation kits for the Housing Counseling Center's clients. The kits used in the HCD workshops cost \$50 each. It may be that this price would be excessive for the HCD counseling center's budget. If so, it is recommended that some items be eliminated from the kits to bring the costs of the kits into alignment with the center's budget.

The project staff bought the items for the HCD kits by contracting with one hardware store, Colonial Hardware, in Memphis. Colonial Hardware had previously contracted with Shelby County Government to provide items for its divisions and agencies as needed. The staff contacted the store's representative, told him what items were needed, told him how many items were needed--and the procurement process was completed. Because the items were bought "in bulk" from Colonial's warehouse, the project staff received a considerable discount from what the items' costs would have been had the items had been purchased at a retail outlet.

* Consider Holding Energy Conservation Workshops for Home Health Aides. At one point during the project, it appeared that HCD would not be able to participate with the project staff in developing the energy conservation workshop. The project staff then was considering other potential audiences for the workshop. One idea suggested was to present the energy conservation workshops to home health aides, also known as homemakers. In Memphis, many low-income, elderly, or handicapped persons are served by Senior Citizens Services (SCS), an organization employing approximately 500 home health aides. Home health aides make frequent visits in the homes of their clients and assist in performing basic housekeeping and personal care chores. It was reasoned that

the home health aides would be able to check for signs of energy waste in their clients' homes as they performed their housekeeping duties. Discussions with the staff of SCS revealed that the directors of the organization were receptive to scheduling such workshops. However, when HCD re-emerged as a active participant in the energy conservation workshop, the idea to produce a workshop for SCS was abandoned in favor of HCD.

It is recommended that an agency producing an energy conservation workshop should consider including local home health aid organizations as a potential audience.

* Use the Portland Energy Office Video in Education Programs of TVA. MLGW is now in the process of making changes to the Portland Energy Office video for more effective use in Memphis as an instructional video on energy conservation. It is recommended that TVA consider using MLGW's version of the video as well in its consumer education programs.

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APPENDIX A: RESIDENTIAL ENERGY ADVISORY COMMITTEE

FIRSTNAME	LASTNAME...	COMPANY.....	STREET.....	CITY.....	STATE	ZIP..	TELEPHONE....
Claude	Braganza	Braganza and Associates	2029 Peabody Ave.	Memphis	TN	38104	(901)276-2600
Vernua	Hanrahan	Center for Neighborhoods	619 N. Seventh Street	Memphis	TN	38107	(901)526-6627
Terry	Hughes	Construction Code Enforcement	160 N. Mid-America Mall, Rm. 750	Memphis	TN	38103	(901)576-5341
Dexter	Muller	Div. of Planning and Development	125 N. Mid-America Mall, Rm. 468	Memphis	TN	38103	(901)576-7197
Cliff	Norville	Div. of Planning and Development	125 N. Mid-America Mall, Rm. 468	Memphis	TN	38103	(901)576-7155
Jeff	Reece	Div. of Planning and Development	125 N. Mid-America Mall, Rm. 468	Memphis	TN	38103	(901)576-7179
Maggie	Conway	Div. of Planning and Development	125 N. Mid-America Mall, Rm. 468	Memphis	TN	38103	(901)576-7167
Ronnie	Tickle	Home Builders Assoc. of Memphis	776 N. Germantown Rd	Memphis	TN	38108	(901)872-8146
Jay	West	Home Builders Assoc. of Tenn.	206 Capitol Blvd., Suite 200	Nashville	TN	37219	(615)726-1700
John	Owen	Housing & Community Development	701 N. Main Street	Memphis	TN	38107	(901)576-7351
Dave	Ralston	Housing & Community Development	701 N. Main Street	Memphis	TN	38107	(901)576-7379
David	Laster	Housing & Community Development	701 N. Main Street	Memphis	TN	38107	(901)576-7336
Debra	Brown	Housing & Community Development	701 N. Main Street	Memphis	TN	38107	(901)576-7300
Andrew	Harvey	Housing & Community Development	701 N. Main Street	Memphis	TN	38107	(901)576-7326
Bill	Melvin	Housing and Urban Development	75 Spring St. S.W., 5th floor	Atlanta	GA	30303	(404)331-4129
Bob	Atkins	Housing and Urban Development		Memphis	TN		(901)544-3367
Calvin	Herring	Leader Federal		Memphis	TN		(901)578-2462
Rodney	Hubbard	MEDFAC Engineering	2006 Cranberry Dr.	Memphis	TN	38134	(901)386-4892
Bruce	Fisackerly	Memphis Chapter of ASHRAE	2430 Poplar Ave	Memphis	TN	38112	(901)327-8222
Becky	Garland	Memphis Light, Gas and Water	P.O. Box 430	Memphis	TN	38101	(901)528-4748
Rita	Heffner	Memphis Light, Gas and Water	P.O. Box 430	Memphis	TN	38101	(901)528-4188
Becky	Delich	Memphis Light, Gas and Water	P.O. Box 430	Memphis	TN	38101	(901)528-4547
Larry	Brown	Memphis Light, Gas and Water	220 S. Main	Memphis	TN	38101	(901)528-4545
Eugene	Rosser	Memphis Light, Gas and Water	220 S. Main	Memphis	TN	38101	(901)528-4448
Jules	Wade	Mphs. Area Assoc. of Realtors	P.O. Box 171159	Memphis	TN	38187	(901)685-2100
Bill	Mixon	Oak Ridge National Lab	P.O. Box 2008	Oak Ridge	TN	37831	(615)576-7323
Roy	Nixon	Roy C. Nixon Realtors	2500 Mt. Moriah Rd.	Memphis	TN	38118	(901)366-6300
David	Chapman	TN Housing & Development Agency	P.O. Box 3140	Nashville	TN	37219	(615)741-4958
Stanley	Houle	TN Housing & Development Agency	P.O. Box 3140	Nashville	TN	37219	
Marvin	Palmer	TN Real Estate Commission, West	841 S. Cooper	Memphis	TN	38104	(901)726-1674
Gwen	Harris	Tennessee Energy Division	320 6th Ave., North, 6th floor	Nashville	TN	37219	(615)741-2994
Paul	Jennings	Tennessee Energy Institute	Memphis State University	Memphis	TN	38111	(901)678-4057
Albert	Laabs	Tennessee Energy Institute	109 South Campus Bldg. #1 (MSU)	Memphis	TN	38152	(901)678-4057
Barbara	Nieri	Tennessee Valley Authority	1101 Market	Chattanooga	TN	37402	(615)751-5261

Housing & Community Development Homes

#	Address	Area	Electricity				Elec/ Gas DHW	Natural Gas			Residents					
			Total Annual Cost	Annual Baseload Cost	A/C	Annual Cooling Cost		Total Annual Cost	Annual Baseload Cost	Annual Heating Cost	Total	0-12	13-22	23-62	63+	Daytime
1	1068 Philadelphia	1040	\$388	\$243	Y	\$145	Gas	\$314	\$203	\$111	1				1F	1
2	1062 Bellevue	1040	\$169	\$169	N	N/A	Gas	\$205	\$144	\$61	ND					
3	3770 Sewanee	1040	\$230	\$223	Y	\$7	Gas	\$344	\$143	\$201	4	2F		1F	1F	4
4	215 Caldwell	1040	\$829	\$588	Y	\$241	Gas	\$176	\$78	\$98	1				1F	1
5	1499 Cane	1040	\$854	\$546	Y	\$308	Gas	\$287	\$190	\$97	2			1M	1F	2
6	3353 Forrester	1040	\$402	\$302	Y	\$100	Gas	\$344	\$209	\$135	2				1M/1F	2
7	1734 Carning	1040	\$933	\$675	Y	\$258	Gas	\$439	\$326	\$113	ND					
8	3257 Garver	1040	\$482	\$361	Y	\$121	Gas	\$304	\$192	\$112	1				1F	1
9	634 Pontotoc	1040	\$423	\$414	Y	\$10	Gas	\$259	\$168	\$91	2				1M/1F	2
10	758 Porter	1040	\$680	\$399	Y	\$281	Gas	\$328	\$226	\$102	2			1M	1F	2
11	754 Nonconnah	1040	\$626	\$467	Y	\$159	Gas	\$347	\$223	\$124	ND					
12	27 E. Utah	1040	\$312	\$312	N	N/A	Gas	\$410	\$196	\$214	ND					
13	3764 Whittier	1040	\$409	\$312	Y	\$97	Gas	\$311	\$157	\$154	2				2F	2
14	3736 Whittier	1040	\$833	\$547	Y	\$286	Gas	\$334	\$212	\$122	ND					
15	1616 Hugnot	1040	\$478	\$478	N	N/A	Gas	\$342	\$206	\$136	ND					
16	3109 Peggy	1040	\$295	\$266	Y	\$29	Gas	\$373	\$162	\$211	2				2M	2
17	708 Sims	1000	\$528	\$435	Y	\$93	Gas	\$408	\$325	\$83	2			1M	1F	2
18	709 Farris	1040	\$711	\$367	Y	\$344	Gas	\$361	\$274	\$87	ND					
19	4767 Percy	1040	\$441	\$313	Y	\$128	Gas	\$278	\$172	\$106	2			2F		1
20	1123 S. Somerville	1040	\$431	\$313	Y	\$118	Gas	\$344	\$194	\$150	1				1F	1
21	1470 Standridge	1040	\$793	\$458	Y	\$335	Gas	\$363	\$289	\$74	1				1F	1
22	1098 Kerr	1040	\$634	\$386	Y	\$248	Gas	\$338	\$160	\$178	3	1M		1M/1F		2
23	3621 Vivia	1040	\$713	\$586	Y	\$127	Gas	\$219	\$134	\$85	ND					
24	999 Pearce	1040	\$1,026	\$469	Y	\$557	Gas	\$272	\$158	\$114	ND					
25	2296 Shasta	1040	\$693	\$413	Y	\$280	Gas	\$295	\$187	\$108	2				1M/1F	2
26	3437 Tallyho	1040	\$310	\$233	Y	\$77	Gas	\$273	\$105	\$168	1				1M	1
27	902 N. Main	1040	\$842	\$669	Y	\$173	Gas	\$166	\$55	\$111	3			1M	1M/1F	2
28	189 Bickford	1040	\$526	\$308	Y	\$218	Gas	\$344	\$254	\$90	ND					
29	5310 Norma	1040	\$549	\$414	Y	\$135	Gas	\$326	\$168	\$158	2				2M	2
30	4401 Sewanee	1040	\$387	\$301	Y	\$86	Gas	\$329	\$232	\$97	2				1M/1F	2
31	1691 Kansas	1040	\$492	\$369	Y	\$123	Gas	\$636	\$158	\$478	1				1F	1
32	1647 Ash	1040	\$377	\$263	Y	\$114	Gas	\$247	\$128	\$119	2			1M	1F	1
33	1337 Texas	1040	\$165	\$165	N	N/A	Gas	\$384	\$120	\$264	1				1F	1

APPENDIX B: HCD/COMFORT PLUS 1991 UTILITY DATA

Housing & Community Development Homes

	#	Address	Area	Electricity				Elec/ Gas DNM	Natural Gas			Residents					
				Total Annual Cost	Annual Baseload Cost	A/C	Annual Cooling Cost		Total Annual Cost	Annual Baseload Cost	Annual Heating Cost	Total	0-12	13-22	23-62	63+	Daytime
UT 03	34	730 Chelsea	1350	\$692	\$290	Y	\$402	Gas	\$654	\$200	\$454	2			1F	1F	2
	35	761 Chestnut	1000	\$518	\$308	Y	\$210	Gas	\$338	\$202	\$136	2			1M	1F	1
	36	3850 Fizer	1040	\$764	\$485	Y	\$279	Gas	\$271	\$218	\$53	4	1F	1F	1F	1F	2
	37	1404 Britton	1040	\$918	\$463	Y	\$455	Gas	\$393	\$325	\$68	ND					
	38	123 Modder	1040	\$828	\$447	Y	\$381	Gas	\$311	\$88	\$223	3			1M	1M/1F	3
	39	202 Caldwell	1040	\$388	\$289	Y	\$99	Gas	\$288	\$141	\$147	1				1F	1
	40	2167 Ball	1040	\$1,020	\$651	Y	\$369	Gas	\$686	\$252	\$434	4	1F	1F	1F	1F	3
	41	1390 Raymond	1040	\$323	\$183	Y	\$140	Gas	\$271	\$154	\$117	1				1F	1
	42	1252 Firestone	1040	\$859	\$472	Y	\$387	Gas	\$341	\$212	\$129	ND					
	43	4115 New Willow	1040	\$893	\$666	Y	\$227	Gas	\$246	\$184	\$62	2				1M/1F	2
	44	716 Tate	1040	\$267	\$267	N	N/A	Gas	\$249	\$163	\$86	ND					
	45	3592 Hazelwood	1040	\$193	\$193	N	N/A	Gas	\$99	\$61	\$38	1				1M	1
	46	1067 Kyle	1040	\$735	\$535	Y	\$200	Gas	\$678	\$510	\$168	2				1M/1F	2
	47	89 E. Dempster	1040	\$346	\$272	Y	\$74	Gas	\$358	\$229	\$129	1				1M	1
	48	3847 Orchi	1040	\$497	\$269	Y	\$228	Gas	\$341	\$190	\$151	1				1M	1
	49	984 N. Seventh	1040	\$748	\$460	Y	\$288	Gas	\$261	\$173	\$88	2				1M/1F	2
	50	672 Wells	1040	\$126	\$95	Y	\$31	Gas	\$525	\$520	\$5	2			1F	1F	2
	51	3040 Shannon	1040	\$559	\$359	Y	\$200	Gas	\$341	\$203	\$138	1				1F	1
	52	5316 Louise	1040	\$640	\$541	Y	\$99	Gas	\$426	\$152	\$274	3	1F		1F	1F	2
	53	2350 Douglass	1040	\$685	\$469	Y	\$216	Gas	\$277	\$204	\$73	2				1M/1F	2
	54	1484 Brookins	1040	\$183	\$183	N	N/A	Gas	\$580	\$207	\$373	1				1F	1
	55	1620 Sydney	1040	\$675	\$434	Y	\$241	Gas	\$479	\$225	\$254	1				1F	1
	56	914 N. Bellevue	1040	\$584	\$369	Y	\$215	Gas	\$516	\$249	\$267	3	1M		1F	1M	1
	57	892 Claybrook	1040	\$236	\$141	Y	\$95	Gas	\$271	\$164	\$107	2			1F	1F	1
	58	1307 Gaither	1040	\$419	\$333	Y	\$86	Gas	\$350	\$115	\$235	2				1M/1F	2
	59	2155 Shannon	1040	\$462	\$309	Y	\$153	Gas	\$458	\$161	\$297	2				1M/1F	2
	60	1304 Philadelphia	1040	\$314	\$208	Y	\$106	Gas	\$374	\$98	\$276	1				1F	1
	61	2231 Clarksdale	1040	\$520	\$361	Y	\$159	Gas	\$585	\$191	\$394	1				1F	1
	62	2376 Hubbard	1040	\$452	\$369	Y	\$83	Gas	\$528	\$191	\$337	1				1F	1
	63	57 E. Gage	1040	\$507	\$320	Y	\$187	Gas	\$600	\$267	\$333	3		1F	1F	1F	1
	64	1667 Ely	1040	\$238	\$136	Y	\$102	Gas	\$242	\$93	\$149	1				1F	1
	65	2362 Douglass	1040	\$293	\$235	Y	\$58	Gas	\$433	\$117	\$316	1				1F	1

Housing & Community Development Homes

	#	Address	Area	Electricity				Elec/ Gas DHW	Natural Gas			Residents					
				Total Annual Cost	Annual Baseload Cost	A/C	Annual Cooling Cost		Total Annual Cost	Annual Baseload Cost	Annual Heating Cost	Total	0-12	13-22	23-62	63+	Daytime
57 60	66	1575 Carpenter	1040	\$578	\$369	Y	\$209	Gas	\$631	\$251	\$380	3		1F	1F	1F	1
	67	3105 Mt. Olive	1040	\$697	\$421	Y	\$276	Gas	\$340	\$153	\$187	3			1M	1M/1F	2
	68	109 E. Utah	1040	\$628	\$401	Y	\$227	Gas	\$640	\$263	\$377	2			1M/1F		1
	69	770 Roanoke	1300	\$939	\$559	Y	\$380	Gas	\$941	\$430	\$511	3		1M	1F	1F	1
	70	1316 Niese	1040	\$268	\$268	N	N/A	Gas	\$392	\$91	\$301	ND					
	71	1669 Humber	1040	\$317	\$200	Y	\$117	Gas	\$887	\$522	\$365	1				1F	1
	72	1281 Vollintine	1300	\$1,239	\$838	Y	\$401	Gas	\$884	\$320	\$564	5	1F	2M	1F	1M	3
	73	142 Vaal	1040	\$135	\$135	N	N/A	Gas	\$266	\$137	\$129	1				1F	0
	74	1871 Hicks	1350	\$977	\$575	Y	\$402	Gas	\$593	\$218	\$375	2				1M/1F	2
	75	1495 Cameron	1040	\$89	\$89	N	N/A	Gas	\$565	\$234	\$331	ND					
	76	720 Los Angeles	1040	\$704	\$573	Y	\$131	Gas	\$351	\$242	\$109	3	1M		1F	1F	3
	77	640 Harahan	1040	\$341	\$222	Y	\$119	Gas	\$339	\$213	\$126	1				1F	1
	78	1308 Tunica/132 Austin	1040	\$291	\$224	Y	\$67	Gas	\$468	\$148	\$320	1				1M	1

Total Electric Cost

All HCD Homes

Electric Baseload Cost

HCD Homes with A/C

Electric Cooling Cost

HCD Homes with A/C

Total Gas Cost

All HCD Homes

Gas Baseload Cost

All HCD Homes

Baseload represents DHW heater use only.

Gas Heating Cost

All HCD Homes

Total Utility Cost

HCD Homes with 1 to 2 Occupants

Total Utility Cost

HCD Homes with 3 to 5 Occupants

Total Utility Cost

HCD Homes with Child Occupants

Total Utility Cost

HCD Homes with Senior Adult Occupants

COMFORT PLUS HOMES

#	Address	Area	Electricity				Elec/ Gas DHW	Natural Gas			Residents					
			Total Annual Cost	Annual Baseload Cost	A/C	Annual Cooling Cost		Total Annual Cost	Annual Baseload Cost	Annual Heating Cost	Total	0-12	13-22	23-62	63+	Daytime
1	1374 Locke Cuba	1614	\$950	\$654	Y	\$296	Gas	\$404	\$216	\$188	5	1M/1F	1M/2F			1
2	2524 Laurelcrest	1508	\$909	\$627	Y	\$282	Gas	\$292	\$89	\$203	2		1F	1F		1
3	2531 Laurelcrest	1202	\$573	\$436	Y	\$137	Gas	\$248	\$110	\$138	2			1M/1F		0
4	2537 Laurelcrest	1515	\$569	\$368	Y	\$201	Gas	\$281	\$119	\$162	3	1F		1M/1F		2
5	2576 Laurelcrest	1343	\$692	\$502	Y	\$190	Gas	\$338	\$155	\$183	2			1M/1F		0
6	2584 Laurelcrest	1375	\$801	\$500	Y	\$301	Gas	\$299	\$159	\$140	ND					
7	2590 Laurelcrest	1403	\$501	\$288	Y	\$213	Gas	\$291	\$89	\$202	ND					
8	2600 Laurelcrest	1343	\$876	\$616	Y	\$260	Gas	\$364	\$154	\$210	ND					
9	2601 Laurelcrest	1465	\$991	\$792	Y	\$199	Elec	\$330	\$37	\$293	2			1M/1F		1
10	2634 Laurelcrest	1202	\$824	\$645	Y	\$179	Elec	\$229	\$37	\$192	ND					
11	2637 Laurelcrest	1515	\$1,494	\$1,266	Y	\$228	Elec	\$210	\$39	\$171	ND					
12	2538 Sage Meadow	1211	\$589	\$426	Y	\$163	Gas	\$290	\$134	\$156	4		1M/1F	1M/1F		0
13	2555 Sage Meadow	1202	\$842	\$570	Y	\$272	Gas	\$288	\$133	\$155	ND					
14	2562 Sage Meadow	1515	\$528	\$382	Y	\$146	Gas	\$249	\$87	\$162	ND					
15	2565 Sage Meadow	1202	\$518	\$335	Y	\$183	Gas	\$331	\$127	\$204	3	1M		1M/1F		0
16	2571 Sage Meadow	1748	\$514	\$365	Y	\$149	Gas	\$285	\$135	\$150	ND					
17	2704 Sage Meadow	1748	\$1,048	\$659	Y	\$389	Gas	\$419	\$143	\$276	2			1M/1F		0
18	2728 Sage Meadow	1748	\$809	\$399	Y	\$210	Gas	\$302	\$103	\$199	ND					
19	2729 Sage Meadow	1508	\$815	\$482	Y	\$333	Gas	\$307	\$106	\$201	2			1M/1F		0
20	2734 Sage Meadow	1508	\$705	\$451	Y	\$254	Gas	\$363	\$141	\$222	ND					
21	2558 Sunbury	1511	\$447	\$298	Y	\$149	Gas	\$284	\$110	\$174	ND					
22	2575 Sunbury	1447	\$509	\$358	Y	\$151	Gas	\$310	\$134	\$176	ND					
23	2594 Sunbury	1629	\$1,129	\$960	Y	\$169	Elec	\$318	\$44	\$274	ND					
24	2610 Sunbury	1465	\$1,029	\$912	Y	\$117	Elec	\$258	\$40	\$218	4	1M	1F	1M/1F		2
25	2618 Sunbury	1508	\$776	\$567	Y	\$209	Gas	\$283	\$74	\$209	4	2M		1M/1F		0
26	2621 Sunbury	1202	\$844	\$580	Y	\$264	Gas	\$372	\$149	\$223	4	2F		1M/1F		0
27	2627 Sunbury	1629	\$797	\$532	Y	\$265	Gas	\$346	\$140	\$206	2			1M/1F		0
28	2632 Sunbury	1511	\$408	\$268	Y	\$140	Gas	\$304	\$101	\$203	ND					
29	2728 Country Lawn	1202	\$1,098	\$886	Y	\$212	Elec	\$212	\$37	\$175	ND					
30	2715 Arbor Lane	1202	\$726	\$575	Y	\$151	Elec	\$235	\$37	\$198	2			1M/1F		0
31	2733 Arbor Lane	1465	\$1,096	\$770	Y	\$326	Elec	\$165	\$37	\$128	ND					
32	2741 Arbor Lane	1202	\$694	\$557	Y	\$137	Elec	\$198	\$37	\$161	4	2F		1M/1F		0

COMFORT PLUS HOMES

#	Address	Area	Electricity			Elec/ Gas DHW	Natural Gas			Residents					
			Total Annual Cost	Annual Baseload Cost	A/C	Annual Cooling Cost	Total Annual Cost	Annual Baseload Cost	Annual Heating Cost	Total	0-12	13-22	23-62	63+	Daytime
33	2747 Arbor Lane	1465	\$1,070	\$803	Y	\$267	Elec	\$205	\$38	\$167	4	2M	1M/1F		1
34	2766 Arbor Lane	1202	\$1,111	\$826	Y	\$285	Elec	\$184	\$37	\$147	4	2M	1M/1F		2
35	2735 Green Hollow	1465	\$901	\$648	Y	\$253	Elec	\$260	\$42	\$218	2		1M/1F		1
36	5245 Ross	1620	\$655	\$335	Y	\$320	Gas	\$306	\$115	\$191	3	1M	1M/1F		0
37	5329 Ross	1572	\$823	\$591	Y	\$232	Gas	\$261	\$88	\$173	1		1M		0
38	5406 Ross	1618	\$778	\$525	Y	\$253	Gas	\$370	\$152	\$218	ND				
39	5351 Crockett Cove	1543	\$865	\$488	Y	\$377	Gas	\$362	\$110	\$252	2		1M/1F		1
40	5364 Stephen Forest	1543	\$870	\$700	Y	\$170	Gas	\$390	\$116	\$274	2		1M/1F		0
41	6538 Star Valley	2152	\$1,152	\$781	Y	\$371	Gas	\$350	\$87	\$263	2		1M/1F		1
42	6624 Woodpark	1403	\$728	\$457	Y	\$271	Gas	\$290	\$153	\$137	ND				
43	6656 W. Spencer Forest	1620	\$802	\$540	Y	\$262	Gas	\$372	\$91	\$281	1		1F		1
44	6662 W. Spencer Forest	1620	\$1,105	\$685	Y	\$420	Gas	\$340	\$138	\$202	ND				
45	6670 W. Spencer Forest	1620	\$669	\$427	Y	\$242	Gas	\$311	\$114	\$197	2		1M/1F		0
46	6763 Finch	1507	\$696	\$375	Y	\$321	Gas	\$291	\$132	\$159	ND				
47	6787 Finch	1543	\$785	\$490	Y	\$295	Gas	\$367	\$181	\$186	4	2M	1M/1F		2
48	6809 Finch	1400	\$631	\$406	Y	\$225	Gas	\$309	\$154	\$155	2		1M	1M	2
49	7455 Valley Mist	1515	\$1,150	\$894	Y	\$256	Elec	\$243	\$37	\$206	3		1M/2F		1
50	7504 Valley Mist	1202	\$919	\$675	Y	\$244	Elec	\$270	\$46	\$224	3	1F	1M/1F		2
51	7510 Valley Mist	1202	\$591	\$447	Y	\$144	Elec	\$181	\$37	\$144	ND				
52	7514 Valley Mist	1515	\$816	\$620	Y	\$196	Elec	\$310	\$49	\$261	ND				
53	7522 Valley Mist	1202	\$783	\$688	Y	\$95	Elec	\$137	\$39	\$98	2		1M/1F		0
54	7478 Meadowland	1515	\$950	\$703	Y	\$247	Elec	\$232	\$37	\$195	3	1F	1M/1F		0
55	7482 Meadowland	1515	\$1,170	\$1,066	Y	\$104	Elec	\$173	\$37	\$136	5		2M/1F	1M/1F	0
56	7486 Meadowland	1202	\$1,004	\$839	Y	\$165	Elec	\$283	\$47	\$236	ND				
57	7490 Meadowland	1515	\$1,132	\$775	Y	\$357	Elec	\$231	\$43	\$188	2		1M/1F		1
58	7504 Meadowland	1202	\$850	\$681	Y	\$169	Elec	\$156	\$38	\$118	ND				
59	7513 Meadowland	1202	\$1,002	\$856	Y	\$146	Elec	\$181	\$38	\$143	3	1F	1M/1F		1
60	7514 Meadowland	1202	\$999	\$859	Y	\$140	Elec	\$240	\$41	\$199	ND				
61	7520 Meadowland	1508	\$556	\$421	Y	\$135	Gas	\$326	\$125	\$201	1		1F		0
62	7526 Meadowland	1479	\$724	\$538	Y	\$186	Gas	\$330	\$135	\$195	ND				

COMFORT PLUS HOMES

#	Address	Area	Electricity			Elec/ Gas DHW	Natural Gas			Residents					
			Total Annual Cost	Annual Baseload Cost	Annual Cooling A/C Cost		Total Annual Cost	Annual Baseload Cost	Annual Heating Cost	Total	0-12	13-22	23-62	63+	Daytime
63	7532 Meadowland	1515	\$1,318	\$1,084	Y	\$234	Elec	\$208	\$37	\$171	3		1F	1M/1F	1
64	7538 Meadowland	1610	\$793	\$543	Y	\$250	Gas	\$376	\$203	\$173	ND				
65	7542 Meadowland	1629	\$759	\$625	Y	\$134	Gas	\$266	\$115	\$151	3	1M	1M/1F		2
66	7624 Reese	1202	\$520	\$426	Y	\$94	Elec	\$276	\$102	\$174	2		1M/1F		0
67	7644 Reese	1202	\$617	\$383	Y	\$234	Gas	\$277	\$140	\$137	3	1F	1M/1F		0
68	7705 Deerfield Trace	1508	\$467	\$315	Y	\$152	Gas	\$323	\$134	\$189	ND				
69	7706 Deer Trail	1516	\$810	\$488	Y	\$322	Gas	\$259	\$147	\$112	2			1M/1F	2
70	7725 Deer Trail	1680	\$367	\$240	Y	\$127	Gas	\$312	\$123	\$189	2		1M/1F		1
71	7757 Deer Trail	1557	\$602	\$429	Y	\$173	Gas	\$323	\$160	\$163	ND				
72	7895 Deer Trail	1526	\$1,028	\$739	Y	\$289	Elec	\$217	\$44	\$173	3		2M/1F		1
73	8284 Clinton Way	1560	\$530	\$380	Y	\$150	Gas	\$248	\$118	\$130	ND				

Total Electric Cost

Comfort Plus Homes

Electric Baseload Cost

Comfort Plus Homes

Electric Cooling Cost

All Comfort Plus Homes

Total Gas Cost

Comfort Plus Homes

Gas Baseload Cost

Comfort Plus Homes

Gas Heating Cost

All Comfort Plus Homes

Total Utility Cost

CP Homes with 1 to 2 Occupants

Total Utility Cost

CP Homes with 3 to 5 Occupants

Homes with electric DHW heaters

Total Utility Cost

CP Homes with 1 to 2 Occupants

Homes with gas DHW heaters

Total Utility Cost

CP Homes with 3 to 5 Occupants

Total Utility Cost

CP Homes with Child Occupants

Total Utility Cost

CP Homes with Senior Adult Occupants

Household Members Comparison

APPENDIX C: SOURCES FOR VIDEOTAPES ON ENERGY CONSERVATION

1. The Video Source Book

Gale Research Inc.
Detroit, Michigan

A guide to approximately 126,000 programs currently available on video from more than 1,500 sources. Subject areas include movies/entertainment, sports/recreation, fine arts, general interest, education, health/science, business/industry, children/juvenile, and how-to/instruction. The book is indexed by subject, producer, distributor, etc. There are approximately 200 videotapes listed under the subject heading "Energy." The book is available at most public libraries.

2. National Appropriate Technology Assistance Service (NATAS). "Sources of Audiovisual Materials on Appropriate Technology Topics."

U.S. Department of Energy
P.O. Box 2525
Butte, Montana 59702-2525
1-800-428-2525

A list of more than 75 distributors of audiovisual materials with addresses and telephone numbers. The list is available by contacting NATAS.

3. Portland Energy Office. "Ten Quick Ways to Cut Your Energy Bill."

Order from: Extension Stockroom
Oregon State University
Ballard Extension Hall
Corvallis, Oregon 97331-3606

APPENDIX D: RESIDENTIAL ENERGY CONSERVATION WORKSHOP AGENDA

1. INTRODUCTION

- a. Welcome participants.
- b. Introduce workshop sponsors.
- c. Explain the purpose of the workshop.
- d. Discuss typical residential energy expenses.

2. VIDEO PRESENTATION

- a. Show video: "Ten Quick Ways to Cut Your Energy Bill" (Run time: 20 minutes)
- b. Clarify additional points not included in the video: air conditioning, MLGW blower door, foam adhesive weatherstripping, etc.
- c. Question-and-answer session on video.

3. ENERGY CONSERVATION DISCUSSION

- a. Review conservation workbook. Emphasize air conditioning, heating and kitchen tips.
- b. Teach participants how to read their utility meters. Use meter dial display.
- c. Review a typical utility bill to ensure that participants know how to read them.
- d. Present energy conservation kit items.

4. DEMONSTRATIONS

- a. Caulking: Windows, baseboards
- b. Reglazing broken or cracked window panes
- c. Changing air conditioning filters
- d. Plumbing: Repairing leaky faucets, installing flow restrictors
- e. Weatherstripping: Doors and windows
- f. Receptacle and light switch plate gaskets

5. CONCLUSION

- a. Question-and-Answer Session
- b. "Help Line" Numbers
- c. Distribution of Energy Kits

NOTE: The workshop is intended to last about two hours.

APPENDIX E:

ENERGY CONSERVATION WORKBOOK

Helpful Hints To LOWER
Your Utility Bill

MEMPHIS LIGHT, GAS AND WATER DIVISION

Utility bill for John Doe
used at 567 Anywhere Dr.

for 32 days service
from Jul 28 to Aug 29
Sep 28

Conditions permitting, your meters are to read again on

SRV & RT	HEADINGS CURRENT	PREVIOUS	MULTI- PLIER	USAGE	TOTAL AMOUNT
G-1	2260	2230		30	17.21
E-1	24818	22657		2159	121.78
W-7	1504	1492		12	9.40

BALANCE 148.39

When You Are Trying To KEEP WARM

It **Wastes**
your money when you...

It **Saves**
your money when you...

<p>...have no insulation in your attic.</p>	1.	<p>...put insulation in your attic.</p>
<p>...keep heat too high or heat whole house.</p>	2.	<p>...keep heat low. Heat only space needed. Close off other rooms.</p>
<p>...have open fireplace or damper.</p>	3.	<p>...close fireplace or damper when not in use.</p>
<p>...have a broken window</p>	4.	<p>...stop the cold air. Cover holes with cardboard, paper, rags or foil.</p>
<p>...have window raised while heating house.</p>	5.	<p>...keep windows tightly closed. Cover them with plastic.</p>
<p>...leave an outside door open.</p>	6.	<p>...close outside doors quickly.</p>
<p>...don't dress according to the temperature. Don't dress warmly.</p>	7.	<p>...wear warm clothes in several layers.</p>

IS YOUR HOME READY FOR

Check your Home Against These Tips:

1. Attic or vaulted ceilings have been insulated with values between R-19 to R-30. If not, add more.
2. Windows have been made air tight and weatherstripped around and between sashes. Cracked or broken panes have been replaced.
3. If you do not have storm windows, each window has been covered with an air-tight polyethylene sheeting of 4 to 6 mil thickness.
4. All doors leading outside or to unheated spaces have been weatherstripped and have tight-fitting thresholds.
5. Doors and access panels to unheated spaces such as the attic, basement, or utility room have been insulated and weatherstripped.
6. Good quality caulking has been used to seal air leaks any place that two building materials meet. Included are window and door frames, behind baseboards, around chimneys and mantles, etc.
7. All openings through floors, walls and ceilings have been caulked and insulated, especially those around plumbing, wiring, vents, ducts and TV cables. Vent dampers have been installed to reduce heat loss through exhaust fans and dryer vents.
8. Filters in central heating systems have been cleaned or replaced.
9. Joints and elbows of forced-air ducts have been sealed with duct tape and all ductwork has been wrapped with at least R-11 insulation. Replace loose tape where needed.
10. Grills for floor furnaces, heaters and vents have been cleared of obstructions such as draperies or furniture.
11. In multi-level homes, dampers or vents for forced-air systems have been adjusted to deliver more heat to the colder lower floors.
12. The pilot light, burner and flue for a gas furnace have been given a thorough maintenance check. Flames burn quietly and with a blue color.

13. Dust and grime have been cleaned from the gas floor furnace and rugs or furniture arranged to permit heated air to flow freely.
14. Radiator surfaces have been cleaned and annual maintenance of the radiator system has been performed. (Proper water level and air pressure are important for efficiency and safety.)
15. Room space heaters have had dust removed and have been given a thorough safety check.
16. Fireplace and stove chimneys have had soot and creosote build-up removed to reduce the danger of a fire.
17. The fireplace has been fitted with a full-closing, regulating type damper to prevent heat loss. An airtight door has been added to prevent drafts as the fire burns down. Unused fireplaces have been sealed with an airtight cover such as a flat metal plate.
18. An insulation jacket of at least R-7 value has been installed around the gas or electric water heater.
19. Accessible hot water pipes have been wrapped with insulation. Cold water pipes which might freeze have also been wrapped.
20. All leaky faucets have been repaired. Water flow restrictors have been installed in showers and faucets to increase the water pressure while reducing the flow of water.

*Call 528-4188 to request a booklet, "Insulate Your Water Heater and Save". It includes instructions for insulating a gas or an electric water heater.

**Plug those drafts
Stop those drips
Minimize heat loss
STOP ENERGY WASTE**

Consumer Education

528-4188

When You Are Trying To KEEP COOL

It **Wastes**

your money when you...

It **Saves**

your money when you...

...have no insulation in the attic.

1.

...put insulation in the attic.

...use air conditioner when outside temperature is cool (75° or lower).

2.

...open windows for cross ventilation. Use fan to circulate air.

...leave air conditioner on when no one is home.

3.

...turn air conditioner off when leaving home for four hours or longer.

...cool room to a lower temperature than needed or cool unused rooms.

4.

...run air conditioner only when room is 78°F or hotter and don't cool unused rooms.

...let the sun shine into the room you're trying to cool.

5.

...pull the window shades or curtains in the room you are cooling.

...have window open when air conditioner is on.

6.

...keep windows closed when air conditioner is on.

...close only the storm door.

7.

...close both doors when using the air conditioner.

...do heat producing jobs such as laundering during hotter part of day.

8.

...do heat or moisture producing jobs during cooler part of day.

Compliments of MLGW Consumer Education 528-4188

Source—TVA

IN YOUR HOME

It **Wastes**
your money when...

It **Saves**
your money when you...

...you open oven door to check foods.

1.

...Use clock. Check foods only after normal cook time.

...you cook one food in oven.

2.

...plan to cook several foods at same time.

...you leave heat on high.

3.

...turn food to low after food steams.

...you leave lid off pan.

4.

...use lid to keep heat in and reduce cooking time.

...the TV, lights or radio are on in an empty room.

5.

...turn off TV, lights or radio when nobody is watching or listening.

...you leave the refrigerator door open.

6.

...open and close the door quickly.

...frost is too thick in freezer.

7.

...defrost when frost is 1/4 inch thick.

...Refrigerator or freezer motor and coils are dusty.

8.

...keep motor and coils clean.

When you are COOKING FOOD

It **Wastes**

your money when you...

It **Saves**

your money when you...

Put a little pan on a big eye.

1.

Fit the pan to the right size eye.

Leave the eye on high.

2.

Turn eye to low, after food steams.

Cook with lots of water.

3.

Cook with little water.

Cook food a long time.

4.

Stop cooking when food is tender.

Cook one food in oven.

5.

Cook many foods in oven at same time.

Leave lid off pan.

6.

Put lid on pan. It keeps heat in.

Peek in oven.

7.

Keep oven door closed. Use clock to time food.

Toast bread in oven.

8.

Toast bread in a toaster.

When you have A REFRIGERATOR

It **Wastes**
your money when...

It **Saves**
your money when you...

The frost gets too thick.

1.

Defrost when frost is 1/4 inch thick.

You keep the door open.

2.

Open and close the door quickly.

It is next to a stove, heater or in direct sunlight.

3.

Locate it away from heat.

The motor and coils get dusty.

4.

Keep motor and coils clean.

It is set too cold.

5.

Set it to cool at about 40 degrees. (Set freezer at about zero.)

The door gaskets are worn out.

6.

Replace or repair door gaskets.

Tennessee
Valley
Authority

When You Are Using HOT WATER

It **Wastes**

your money when you...

It **Saves**

your money when you...

...have bare hot water pipes.

1.

...insulate hot water pipes.

...have a leaking faucet.

2.

...fix the leaking faucet.

...fill bathtub full.

3.

...fill tub only $\frac{1}{4}$ full or take a quick shower.

...use full tub of water for a small load of clothes.

4.

...choose correct water level for each wash load.

...use hot wash and warm rinse for most wash loads.

5.

...wash only very dirty clothes in hot water; rinse in cold.

...wash or rinse dishes under running water.

6.

...use double-bowl sink or two pans filled with water.

Compliments of MLGW

Consumer Education 528-4188

Source—TVA

How Much Energy Does Your Home Really Need?

Energy usage varies from one home to another depending upon several factors: the structural design of the house, weather conditions, efficiency of appliances and the family's lifestyle. Monthly usage for heating and air conditioning varies greatly from month to month. However, the amount of energy used for appliances and lighting remains almost the same each month if the number of persons in the household and their daily habits remain the same.

Estimating Your Energy Usage

To get an approximate amount of the energy you can expect to use each month for lighting and appliances (excluding heating and air conditioning), refer to the chart below. Just locate the column that best describes your situation, record the estimated amount of energy for each item you use and add them together for a total.

APPLIANCE USAGE AVERAGES

Electric Kilowatt-Hours Per Month (KWH) Number of Persons	Very Light 1-2 Small Apt.	Light 2 2 Bdr.	Normal 3-4 3 Bdr.	Heavy 4-5 4 Bdr.	Extra Heavy 4-6 4-5 Bdr.	
Lights and Small Appliances	100	200	300	500	700	_____
Refrigerator Freezer	50	70	100	150	200	_____
Frostless Refrig. or Freezer	100	130	150	200	250	_____
Television (Black and White)	30	40	50	60	70	_____
Television (Color)	50	75	100	125	150	_____
Range	50	80	100	200	300	_____
Dryer	40	50	100	200	300	_____
Dishwasher	15	20	30	40	60	_____
Water Heater	200	300	400	600	800	_____
					TOTAL (KWH)	_____

(continued)

Gas Hundreds of Cubic Feet (CCF) Number of Persons	Very Light 1-2 Small Apt.	Light 2 2 Bdr.	Normal 3-4 3 Bdr.	Heavy 4-5 4 Bdr.	Extra Heavy 4-6 4-5 Bdr.	
Range (with pilots)	6	8	10	15	20	_____
Water Heater	15	20	30	40	50	_____
					TOTAL (CCF)	_____

Next, you'll need one of your utility bills for Fall that covers most of October , or Spring that covers most of April. These bills reflect little or no usage for heating or cooling. So, the totals on these bills are close to the actual amount of energy used for lighting and appliances. Just compare your total for electricity (measured in kWh) from this chart, to the amount used on the bill. The same comparison should be made for gas (measured in Ccf). Is your family using more energy than is really necessary? If so, discuss your family's habits and develop a plan to use energy more wisely.

Another comparison you can make deals with your lowest bill from Spring and Fall, plus the highest bill from Summer and Winter. The difference between bills (Spring versus Summer, Fall versus Winter) usually indicates how much energy was used for heating or cooling. Can you lower this amount? To answer this question you must consider the weather, the temperature you maintain inside your home, the efficiency of your equipment and whether or not your home is properly weatherized.

**To request booklets on ways to save energy,
call 528-4188, Consumer Education.**

MEMPHIS LIGHT, GAS and WATER DIVISION

HOW TO READ YOUR METER

Electric meters measure kilowatt hours (KWH) and gas meters measure hundred cubic feet (CCF). Some meters have four dials while others have five, but the method of reading is the same.

If your meter looks like this (dials), read the right one first. Write down the last number the hand has passed.

Note: Some hands turn clockwise and others turn counterclockwise.

This is the way to read a meter. But there is one more thing. If a hand is right on a number and you don't know if it has passed or not, then do this. Look at the dial to the right. Has the hand passed 0?

If this dial on the right has passed 0, write down the number the hand on the left is pointing to. In this case "7."

To find out how much electricity you have used, subtract your previous meter reading from the number you just read. That's how many kilowatt hours (KWH) you have used since then.

If the dial on the right has not passed 0, write down the number the dial on the left has just passed. In this case "6."

EXAMPLE:

New reading	46372
Last reading	<u>45109</u>
Amount of kilowatt hours you have used.	1263

Compliments of Consumer Education

APPENDIX F: ENERGY CODE SURVEY RESULTS

1. Do you think the current Tennessee Energy Code should be revised?

Yes 4

No 0

- Why?
- a) Standards are well below national. Tennessee has high energy consumption due to high levels of air conditioning and heating. We need to build more energy-efficient housing to keep energy costs down.
 - b) The current code is too weak in key areas.
 - c) I think it is in the best interest of the consumer and those who are interested in energy conservation.
 - d) The code requirements are less than average building practices

2. In your opinion, is the current Tennessee Energy Code complied with in your area?

Yes 3

No

Don't Know 1*

* Most probably meet standards voluntarily.

3. Should enforcement of the Tennessee Energy Code be strengthened?

Yes 4

No 0

How? a) Ideally through code department. Make energy-efficiency inspection equivalent to electrical and plumbing.

b) Measures with less than a five-year simple payback: yes. Other measures recommended. _

c) TEC should be as strong as HUD MPS at best.

4. If the Tennessee Energy Code were revised, what other code would you recommend as the model for a new state energy code? Please check one.

 1 Council of American Building Officials (CABO)
Model Energy Code (MEC) (1989)

 1 U.S. Department of Housing and Urban Development
(HUD) Minimum Property Standards (MPS) for
Development (1984)

 2 Other Code: a) Could adapt both codes to
correlate with building
practices in Tennessee.

b) MLGW Comfort Plus Standards.

5. The following section lists thermal performance standards called for in the current Tennessee Energy Code (TEC) and the 1989 MEC. If you agree that the Tennessee Energy Code should be strengthened to the MEC standards, please check "agree." If you do not agree that the TEC should be strengthened to MEC standards, please check "disagree." If you disagree and have a another recommendation, please indicate your recommendation in the last column.

The TEC Should Be
Strengthened To Match
The MEC Standard.

	---RECOMMENDED--- STANDARDS		---Check One---		If You disagree, your standard
	TEC	MEC	Agree	Disagree	
FLAT CEILING	R-19	R-30	<u>4</u>	<u>0</u>	<u> </u>
VAULTED CEILING	R-11	R-30	<u>2</u>	<u>2</u>	<u>R-19</u>
	Solid				
	Wood/	Foam			
EXTERIOR	No	Core			
DOORS	Storm	Steel	<u>2</u>	<u>2</u>	<u>Don't limit</u> <u>by type.</u> <u>Use U- or</u> <u>R-value</u> <u>trade-off.</u>
EXTERIOR WALL/ KNEE WALL INSULATION	R-7	R-13	<u>3</u>	<u>1</u>	<u>Combined</u> <u>total of</u> <u>R-15.</u>
EXTERIOR WALL SHEATHING	Thermo- ply	Black- board	<u>1</u>	<u>3</u>	<u>Specify</u> <u>R-value</u> <u>only.</u>

FLOOR					
SLAB	R-3.25	R-5	<u>2</u>	<u>2</u>	<u>May increase cooling load.</u>
FLOOR					
OVER					
GARAGE	R-7	R-19	<u>2</u>	<u>2</u>	<u> </u>
DUCT					
INSULATION	R-5	R-5.5	<u>1</u>	<u>2</u>	<u>Either.</u>
	Single	Double			
	Glass/	Glass/			
	Aluminum	Wood			
WINDOWS	Frame	Frame	<u> </u>	<u>4</u>	<u>Double glass, aluminum or wood frame.</u>

Comments: a) Require ducts for delivery and returns on all central systems. Require units to be sized properly and split units to match manufacturers' recommendations.

b) Don't be restrictive by specifying materials versus R-value.

6. If the Tennessee Energy Code is revised, should its adoption by local governments be mandatory or optional?

Mandatory 3

Optional 1

- Why? a) Local government should be able to strengthen requirements. State code should be the minimum code.
- b) Only if the code requires cost-effective, short payback measures.
- c) This is only if HUD MPS is used and appraisals are given to reflect the increased cost to the builder.
- d) Without energy efficiency support/enforcement at that level, builders will continue to use lower standards.

7. Of the occupational titles listed below, please check the one that best describes your occupation. (Check one only.)

<u> </u> Architect	<u> </u> Finance Officer
<u> 1 </u> Builder	<u> </u> Housing Consultant
<u> </u> Developer	<u> </u> Planner
<u> 1 </u> Energy Consultant	<u> </u> Realtor
<u> </u> Engineer	<u> </u> Public Official
	<u> 2 </u> Other <u>Utility</u>
	<u>Engineer</u>

8. Additional Comments:

- a) Be sure to allow for unique designs such as direct gain and thermal mass considerations. Perhaps orientation of the building and the windows should be a requirement (minimal/no cost to builders or homeowners).
- b) The code should be changed to afford people more purchasing power to buy a home. By this I mean if one's utilities are reduced, then there is extra money available to purchase that American dream.

APPENDIX G: HERS SELECTION GUIDELINES

Because there is no standardized format, each HERS is unique in design and features. There is no one HERS package that fulfills everyone's requirements. Therefore, it is difficult to purchase an appropriate package without significant preliminary planning.

In the Memphis' deliberation process, several system parameters were identified by MLGW and DPD as most important. These parameters are somewhat generic and common to any decision-makers seeking to select an HERS. These parameters or guidelines are summarized in this appendix; and, it is advised that anyone seeking to purchase an HERS should review them and plan accordingly.

HERS Purchaser

1. Who is the purchaser?
 - A. Government - state or local
 - B. Utility company
 - C. Private agency/consultant
 - D. Other
2. Is the purchase by mandate or voluntary?
3. What is the motive for purchase? How will HERS be used?
 - A. Method for disbursement of housing assistance funds.
 - B. Demand Side Management/Integrated Resource Planning.
 - C. Jobs creation.
 - D. Home renovation marketing.

- E. Improvement of customer relations/public image.
 - F. Other
4. What is the desired output of the package?
- A. A score/rating.
 - B. An audit.
 - C. Energy conservation measures.
5. Are purchase funds in place? Where are they coming from? Will a fee be charged for the home surveys to recover the investment?
6. Who will implement the program? Who will conduct the program's home surveys? How many technicians will be required to service the client population? How will they be trained?
7. Is a certification program required or desired?
8. How will the program be marketed? (This is the most determinant factor in the success or failure of HERS.)

HERS Customer

1. Who will be the principal customers of the HERS?
- A. Home builders, home buyers, or homeowners.
 - B. Low-income, high-income homeowners or all.
 - C. New homes, existing homes, or both.
 - D. Single-family, multifamily homes, or both.
2. What do they want from an HERS? How will they use the output?
- A. Selling a home.

- B. Buying a home.
 - C. Renovating/refinancing a home.
3. Would they pay for the service? Could they afford it?

HERS Software Package

1. What is the total cost of the program?
- A. Software cost.
 - B. Hardware cost.
 - C. Training cost.
 - D. Marketing cost.
 - E. Rebates.
2. What purchase options are available?
- A. Rental or lease agreements.
 - B. Updates - free or fee.
 - C. Software company runs software for fee.
3. Hardware Requirements:
- A. Computer memory - RAM and hard disk space.
 - B. Office PC, LAN, or Laptop.
 - C. Printers - office or portable.
4. Software Design:
- A. Calculation method - Degree-day method, modified bin method, etc.
 - B. Calculation method vs. regional accuracy.
 - C. Software runtime.
 - D. Input flexibility.
 - E. Input for actual utility data - scaled modelling.

- F. Output flexibility - ability to customize output to meet the level of the customer
- G. Applicability to existing/new construction.
- H. Will the HERS' software be compatible with the purchasers' existing software?
- I. Does the system model all three fuel sources?
- J. Does the software calculate economics of energy conservation measures?
- K. Can the HERS be tied to an energy-efficient mortgage program for the benefit of local home buyers and local lending institutions? Is a standard format EEM required?

5. User interaction

- A. Menu-driven, window-driven, etc.
- B. Understandable documentation.
- C. User support/training available?

6. Company History

- A. Are references for the company available from other municipalities/companies?
- B. Does the company offering the HERS have a proven record in the field?
- C. Feedback from current users.
- D. Is the HERS being offered as a "package" program or is the firm willing to develop the program on a per-job basis?

APPENDIX H: MLGW HERS MAILING LIST AND RFP

Distribution List for Request for Proposals (RFP)

ADM Associates, Inc.
3299 Ramos Circle
Sacramento, CA 95827

RLW Analytics, Inc.
56 Captain's Drive
Westbrook, CN 06498

Applied Energy Group, Inc.
810 Woodbury Road
Woodbury, NY 11797

Volt Energy Systems
2500 McCain Place, Suite 217
North Little Rock, AR 72116

Aspen Systems
575 Oak Ridge Turnpike
Oak Ridge, TN 37830

XENERGY, Inc.
3 Burlington Woods
Burlington, MA 01803

Energy Research Group, Inc.
400 Fifth Avenue
Waltham, MA 02154

HEC, Inc.
7330 College Drive
Palos Heights, IL 60463

Demand Management Institute, Inc.
1172 Beacon Street
Newton, MA 02161

Kemper Management Services, Inc.
119 Oakwood Drive
Glastonbury, CN 06033

Quantum Consulting, Inc.
2030 Addison Street, Suite 410
Berkeley, CA 94704

RCG/Hagler, Bailly, Inc.
P.O. Drawer O
Boulder, Colorado 80306

Resource Management International, Inc.
3100 Zinfandel Drive, Suite 600
Sacramento, CA 95670

SRC Systems, Inc.
250 North Sunnyslope Road, Suite 205
Brookfield, WI 53005

Utility Management Services Group, Inc.
78 Main Street
Madison, NJ 07940

Request for Proposal
for
Energy Market Manager

Memphis Light, Gas and Water Division

Memphis, Tennessee

1992

I. Invitation

Memphis Light, Gas and Water Division seeks to acquire a residential module system which satisfies the functional specifications and requirements within this document, in a cost effective manner as determined by Memphis Light, Gas and Water Division.

The Purpose of this "Request for Proposal" is to establish the requirements for a residential module system to be purchased for use in the Memphis Light, Gas and Water Energy Use and Marketing Department, and to insure that proposed software is compatible with the 3.30 and/or greater disk operating system.

Memphis Light, Gas and Water encourages vendors to submit the most current, accurate and complete information in responding to this request for proposal and to offer the best price for the proposed software.

You are hereby invited to submit a proposal for same based upon the requirements and conditions set forth in this request for proposal (RFP) dated .

II. Mailing Instruction

An original and one (1) copy of the completed form or proposal shall be submitted to:

Mr. James T. Moncrief Jr.
Supervisor
Contract Management
Memphis Light Gas and Water Division
P. O. Box 430
Memphis, TN 38101

III. Inquiries

Questions pertaining to the request for proposal should be directed to:

Mr. Eugene G. Rosser
Energy Technician
Memphis Light, Gas and Water Division
P. O. Box 430
Memphis, TN 38101
(901) 528-4188

IV. Time Limit

All proposals must be received no later than two (2) months per date of this proposal.

V. Guidelines for Submitting a Proposal.

Vendors are advised that MLGW will not consider proposals which do not meet or exceed the maximum requirements as set forth within this document. The proposed software must be proven; all components and modules proposed shall be presently installed and in operation at commercial customers outside the vendors organization.

No vendor may withdraw his proposal for a period of One Hundred and twenty (120) days after the date and hour set for receiving proposals.

Each vendor shall submit with his proposal a written statement in sufficient detail to satisfy the Board of Commissioners of Memphis Light, Gas and Water that the vendor has ample software, experience, ability and resources to perform in a satisfactory manner all of the specifications covered by the proposal and the scheduled events within the time specified by the Division. Each vendor must inform himself in all matters which may affect the proposal as no information furnished by the Board of Commissioners of Memphis Light, Gas and Water, or their representatives, upon such matter shall in any way relieve the vendor from risk or responsibility in fulfilling all of the terms of the proposal and specifications.

Vendors who submit a proposal may be required by the Division to make an oral and/or written presentation or demonstration to more fully explain their bid. Refusal to honor a request for a presentation will result in the rejection of the vendors proposal.

All prices shall be totally inclusive of discounts, applicable charges and taxes, and appurtenant cost associated with the Energy Market Manager and/or services provided in response to the request.

MLGW desires the vendor to respond to this request as it is stated and set forth in this document. In order to be fair and consistent with potential vendors, responses to this request which are not complete or require interpretation may result in the rejection of the proposal. MLGW refuses to consider exceptions to any system specifications requirements set forth within this document. However, MLGW will consider optional features provided they are clearly defined and all required information has been properly submitted. MLGW advises each vendor to submit a proposal which meets the requirements of this document.

Each proposal submitted by vendors should be completed and self contained. No reference to any other proposal on behalf of that vendor or any other vendor should be made. If a vendor elects to submit multiple proposals he should designate on the front of the RFP the numerical sequence, beginning with one (1) for his proposals. Each proposal from a vendor will be considered as a separate proposal in the evaluation process.

VI. Proposal Evaluations

The Market Manager module system software will be evaluated based on the following terms:

- A. Product performance of all mandatory requirements.
- B. Initial cost of Market Manager Module System.
- C. Benefit to MLGW of additional features offered by the vendor's product.
- D. Cost of MLGW technical personnel to operate and maintain the program.
- E. Training programs and associated cost.
- F. Cost of any other items, i.e. hardware, peripherals, etc. necessary to ensure that the vendor's product will meet specified requirements.
- G. Vendor support/hours.
- H. Annual maintenance/license renewal cost. Please specify a guarantee "not to exceed" annual rate of increase or price increase history for the past five (5) years.

VII. Proposal Selection

MLGW reserves the right, without qualification:

- a) to select any proposal as a basis for written or oral communication with any or all of the vendors when such action is considered to be in the best interest of MLGW;
- b) to reject all proposal; and
- c) to exercise discretion and apply its judgement with respect to any proposal submitted.

MLGW may select proposals based on initial proposals received without discussion or after limited discussion. MLGW will negotiate with the lowest and best proposal. Vendors are therefore, advised to submit their initial proposal on the most favorable terms.

Memphis Light Gas and Water Division

City Of Memphis

Memphis, Tennessee

Energy Market Manager

PROPOSAL

TO THE BOARD OF LIGHT, GAS AND WATER COMMISSIONERS
MEMPHIS LIGHT, GAS AND WATER DIVISION
MEMPHIS, TENNESSEE

The undersigned, as bidder, declares that the only person, persons, company or party interested in this proposal as principal s are named on page 10, hereof. He proposes and agree that, if this proposal is accepted, he will contract with Memphis Light, Gas and Water Division, Memphis, Tennessee, to furnish a non-exclusive perpetual licence for an Energy Market Manager, all mandatory requirements and to the satisfaction of Memphis Light Gas And Water Division and its authorized representatives.

The word "he" as used in the proposal, is to be understood to include the individual, firm or corporation making the proposal. In case a firm shall be a bidder, it is understood that all statements herein contained shall apply to the firm and to each member thereof.

Contents of the proposal must be presented according to the following outline.

I. COST

The vendor must state the cost and program release number for the Energy Market Manager including all features that maybe required to satisfy system requirements and specifications. The vendor shall state any optional features of the product and state identify any associated cost.

II. DOCUMENTATION

The vendor shall provide two copies of the documentation. The vendor must also state any supplemental documentation that is available in addition to system requirements. The vendor shall state whether or not the documentation is a no-charge item or, if applicable, the charge per copy for the documentation.

III. MAINTENANCE

The vendor shall state the type of maintenance service and updates to the products that are available upon expiration of warranty period, and the annual cost of the service, if any. Include the following information.

- A. current cost of annual maintenance service if applicable (firm or escalated)
- B. History of increases in annual maintenance charge over the past five years.
- C. Full description of the maintenance service offered.

IV. HISTORY

- A. Submit a brief history of your firm.
- B. Describe key role personnel responsibilities and successes with various projects.

V. References

Each vendor shall provide a list of the most current Market Manager installations, if available, utilities utilizing this program with DOS 3.30 or higher versions. Each reference listing shall include company name, address, name and telephone number of primary contact and date installed.

VI. TRAINING

Vendor shall provide a listing of all training programs available to MLGW and program administrators, computer operators and technical support personnel. This list shall include cost per course, duration, and training location.

VII. INSTALLATION

Vendor shall provide technical assistance during the installation if necessary.

VIII. ACCEPTANCE PROCEDURES

- A. The product shall be able to perform all mandatory requirements.
- B. The product documentation shall be supportive of the operations performed.
- C. The acceptance test shall consist of a period of thirty (30) days.

IX. MANDATORY REQUIREMENTS

The following is a list of mandatory list of requirements for the Energy Market Manager.

- A. Hardware Compatibilities

REPORT AND INFORMATION SOURCES

Additional copies of this report, "Upgrade Energy Building Standards and Develop Rating System for Existing Low-Income Housing," are available from:

Publications and Distribution
Public Technology, Inc.
1301 Pennsylvania Avenue, N.W.
Washington, D.C. 20004
(202) 626-2400

Further information regarding the project discussed in this report or information on other energy management activities in the City of Memphis, please contact:

Memphis and Shelby County
Division of Planning and Development
Energy Management Section
125 N. Main Street Mall, Room 468
Memphis, Tennessee 38103
(901) 576-7155

DG/92-306
10/93-150

Publications Price List--UCETF Reports

ITEM #	TITLE	PRICE
90-331	Hydraulic Waste Energy Recovery: A Technical Report	15.00
90-318	A Regulatory Framework for Alternative Fuels and Transportation Management Services	15.00
90-316	Alternative Vehicle Fuels: A Demonstration Project	15.00
90-314	Energy Efficiency in Public Housing	15.00
89-330	Analysis of Programmatic Fleet Conversion to Ethanol Blends	15.00
89-325	An Alternative Fuels Evaluation System for Fleet Vehicles	15.00
89-323	Dual Fuel Conversion Demonstration and Technology Transfer Project	10.00
89-321	Summary of Low and Moderate Income Residential Energy Conservation Programs	15.00
89-315	A Case Study in the Pursuit of Urban Energy Efficiency	15.00
89-314	Communicating with the Public About Environmental Health Risks: A Case Study	13.00
89-313	Evaluation and Comparison of Selected Household Hazardous Waste Collection Facilities	15.00
89-311	Yard Waste Recycling Study: A Pilot Study	15.00
89-310	Sludge Storage Lagoon Biogas Recovery and Use, Volume 1	15.00
89-307	Proceeding: 1989 Electric Utility Franchise Conference	20.00
89-306	Reducing Electricity Demand Through Energy-Related Efficient Construction	15.00
89-304	Modernization of Lighting in Municipal Auditoriums	15.00
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89-301	Implementation of Alternative Technologies through the Assessment of Energy Markets	14.00
88-322	Marketing Energy Efficiency Programs to Commercial and Industrial Firms: Lighting Incentives and	15.00
88-321	Urban Energy Management Today: Ten Year Compendium of UCETF Programs	10.00
88-319	Integrating Energy Efficiency Into Municipal Purchasing Decisions: Computerizing Procurement	15.00
88-318	Household Hazardous Waste: Implementation of a Permanent Collection Facility	20.00
88-317	Hazardous Waste as an Energy Manager's Issue	15.00
88-316	Household Hazardous Waste Management Planning	15.00
88-312	Summary of Small Business Energy Conservation Programs	15.00
88-310	The Earth-Coupled Heat Pump: Utilizing Innovative Technology in Single Family Rehabilitation	15.00
88-309	Energy Planning for Economic Development	18.00
88-308	Conversion of Resource Recovery Steam to Hot and Chilled Water Systems	10.00
88-306	HVAC Equipment Replacement for Best Size and Efficiency, Transfer Report	15.00
88-305	Cogeneration and Cooling in Small Scale Applications	15.00
88-304	Energy Master Planning: Innovative Design and Energy Analysis Services for New Commercial	22.00
88-303	Energy Efficient Building Design: Guidelines for Local Government	15.00
88-302	Direct Digital Control of Air Washer Cooling System	15.00
88-301	Feasibility Study of Transportation Management Strategies in the Poplar Corridor, Memphis, Tennessee	18.00
87-327	Energy Efficient Urban Cooling Technologies: 1st National Conf.	20.00
87-324	Memphis Area Rideshare	15.00
87-317	Joint City Government/Utility Partnerships to Reduce Business Costs	15.00
87-314	The Impact of Budgetary Incentives on Energy Management	15.00

Publications Price List--UCETF Reports

ITEM #	TITLE	PRICE
87-313	Computer Assisted Control for Municipal Water Systems, Phase II	20.00
87-312	Economic Development Through Energy Technology Transfer	15.00
87-311	Electric Utility Franchise Guide	20.00
87-310	Hidden Link: The Energy and Economic Development, Phase II	15.00
87-307	Municipal Underground Storage Tanks: An Energy Manager's Guide	18.00
87-306	Integrating Energy Efficiency into Mun. Purchasing Decisions	20.00
87-305	Energy Enhancement in New Residential Construction	40.00
87-302	Thermal Energy Storage: Application Guide for Local Governments	20.00
87-301	HVAC Equipment Replacement for Best Size & Efficiency	20.00
86-315	Balancing Single Pipe Steam Heating Systems	20.00
86-314	Inhibition of Respiration in Activated Sludge by High Carbon Dioxide Concentration	7.50
86-313	Water Supply System Energy Conservation Through Computer Control	18.00
86-312	Energy Cost Reduction Through Wastewater Flow Equalization	20.00
86-311	High Efficiency Gas Furnace Modification in Low Income Housing	15.00
86-310	Hidden Link: Energy and Economic Development, Phase I	15.00
86-307	Disposal Techniques with Energy Recovery for Scrapped Vehicle Tires	20.00
86-306	District Heating Marketing: Analysis of a Twelve City Survey	20.00
86-305	Technology Transfer for Residential Energy Programs in New Construction and Existing Housing	15.00
86-304	Technology Transfer for Residential Energy Efficiency	15.00
86-302	Neighborhood Energy Efficiency & Reinvestment	15.00
86-301	On-Site Municipal Fuel Cell Power Plan: Feasibility and Application Guide	15.00
85-326	Resource Recovery for Urban Yard Waste	18.00
85-323	Energy Monitoring and Controlling in Municipal Facilities	10.00
85-320	Transportation Management for Business Relocation	15.00
85-319	District Heating in Denmark	10.00
85-318	Computer-Assisted Control for Municipal Water Systems, Phase I	18.00
85-317	Financing Energy Efficient Housing as a Community Economic Development Tool	15.00
85-316	Modular District Heating Planning as a Development Tool	15.00
85-314	Alternative Techniques for Dev. of Energy Efficient Residences	15.00
85-312	Shared Savings and Low Income Homeowners	18.00
85-311	Measures and Investment Options for Community Energy Conservation	18.00
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84-325	Shared Savings in the Residential Market	
84-324	Methanol Use in Vehicle Fleet Operations: Barriers	20.00
84-322	Energy Management and Technology for Urban Governments	15.00
84-321	Hydrate Process for Waste Water Treatment Plant Sludge Dewatering	15.00

Publications Price List--UCETF Reports

ITEM #	TITLE	PRICE
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84-315	Facilities Energy Monitoring System	15.00
84-314	Application of Mini-Van Technology to Vanpool Services	18.00
84-312	Implementation Methods for an Integrated Energy System	10.00
84-311	Feasibility of Water-Based District Heating and Cooling	15.00
84-310	Budgetary Incentives for Municipal Energy Management	22.00
84-309	Central Energy Systems Applications to Economic Development	20.00
84-308	On-Site Cogeneration for Office Buildings	15.00
84-306	Analysis of Municipal Bus Operations for the Advancement of Fuel Cell Technology	15.00
84-305	Computer Based Maintenance	15.00
84-304	Innovative Finance Plans for Privately Owned Waste/Vol. 2	15.00
84-303	Innovative Finance Plans for Privately Owned Waste/ Vol. 1	15.00
84-301	Coordinating Preventive Maintenance with Energy Management	15.00
83-319	The Rehabilitation and Retrofit of Older Houses to Superinsulated Standards	15.00
83-318	Developing Sources and Techniques for Alternative Financing of Energy Conservation	20.00
83-316	Hydrate Process for Dewatering Sewage Sludge	10.00
83-315	Financial Planning for District Heating: Brooklyn Navy Yard	15.00
83-314	Memphis Area Rideshare On-Line Information System	18.00
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83-312	Initial Assessment of District Heating and Cooling	20.00
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83-309	Development of an Energy Park: Issues and Implementation Options	15.00
83-308	Alternative Uses for Digester Methane Gas	25.00
83-307	Innovative Financing and Incentive Package to Reduce Energy	15.00
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82-319	Methanol Use in Vehicle Fleet Operations: Comparisons	15.00
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82-314	Integrating Energy Management with Economic Development	20.00
82-313	Energy Conservation and Economic Development	10.00
82-310	Municipal Technologies	20.00
82-307	Strategies to Improve Community Energy Use Practices	10.00
82-306	Energy Conservation In Water Treatment	
82-305	Development of an Energy Action Plan: Participating Approach	15.00
82-303	Energy Economic Development	20.00

Publications Price List--UCETF Reports

ITEM #	TITLE	PRICE
82-302	Public Housing Energy Efficiency Through Private Financing	10.00
82-300	Developing an Energy Management Tracking System	
81-328	Matching End Use Energy Needs to Source Possibilities	20.00
81-327	Development of a Hydrogen-Fueled Mass Transit Vehicle s	15.00
81-326	Operational and Maintenance Guidelines for Reducing Energy Consumption	
81-324	Energy Management for Small Business	10.00
81-320	Energy Data Gathering, Analysis, and Review System	20.00
81-318	Fuel Management and Planning System for Local Government	25.00
81-316	Production of Ethanol from Cellulosic Fraction	
81-313	Metro-Dade County Comprehensive Energy Emergency Plan	
81-311	Developing Energy Emergency Preparedness	15.00
81-310	Simplified Methodology for Community Energy Management	20.00
81-309	Energy Management: The Public Sector	15.00
81-307	Municipal Technical Assistance-Energy Monitoring	6.00
81-306	New Technology Demonstration	10.00
81-305	Technology Transfer: Unit Report from the Energy Task Force	15.00
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81-303	Municipal Energy Management	10.00
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80-309	Decision Process for the Retrofit of Municipal Buildings	20.00
80-308	Primary Urban Energy Management Planning Methodology	7.50
80-306	Local Government Use of Thermography for Energy	15.00
79-300	Planning for and Purchasing Computer Technology	6.50

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