Ms. Kristi Rhude  
Secretary of the Commission  
Arkansas Public Service Commission  
1000 Center Street  
P.O. Box C-400  
Little Rock, AR 72203  

RE: IN THE MATTER OF CERTAIN REPORTS REQUIRED TO BE FILED BY SOUTH CENTRAL ARKANSAS ELECTRIC COOPERAIVE, INCORPORATED DOCKET NO. 08-055-RP  

Dear Ms. Rhude:  

This letter and its attachment represent the Electric Cooperatives of Arkansas' (“Electric Cooperatives”) Joint Report on Energy Efficiency due on 1 April 2013.  

Order No. 12 in Arkansas Public Service Commission (“Commission”) Docket No. 06-004-R entered on 11 January 2007 (“Order No. 12”) granted the Electric Cooperatives an exemption from the Rules for Conservation and Energy Efficiency Programs (“EER”). As a condition of that exemption, the Electric Cooperatives were directed to file an annual report with the Commission regarding the Electric Cooperatives’ “… EE programs and their results” (“Order No. 12, page 18).
The Report contains the following:

Attachment A is a summary of the Electric Cooperatives’ energy efficiency (“EE”) programs. In addition to a written summary of the various EE programs, Attachment A contains examples of EE educational material used by the Electric Cooperatives, a report on the effectiveness of the Electric Cooperatives’ various demand response programs, and a report on the Electric Cooperatives’ current and planned use of Smart Grid technologies. Attachment A also serves as Arkansas Electric Cooperative Corporation’s EE Report.

Attachment B contains each member cooperative’s 2012 EE Report with supporting material.

While the Electric Cooperatives are exempt from the EER, they are voluntary participants in two programs which are mandatory for natural gas and electric investor owned utilities. These programs are:

1. The Energy Efficiency Arkansas program. The Electric Cooperatives contributed $139,215.20 for the period 1 January 2012 through 31 December 2012; and


The Electric Cooperatives also voluntarily contributed $30,000 to the joint request of Arkansas Energy Office and Arkansas Homebuilders Association to provide “Energy Code Classes” throughout the state.


Sincerely,

Forest Kessinger
Manager, Rates and Forecasting

Attachment

cc: Member Managers
    Duane Highley
Electric Cooperatives of Arkansas
Joint Report

Docket No. 08-061-RP
Attachment A
Arkansas Electric Cooperative Corporation

Docket No. 08-060-RP
The following components are currently being reported by the individual co-ops:

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AECC Programs & Services for Collective ARPSC Report

The Electric Cooperatives of Arkansas were early promoters and educators of energy efficiency and building science. History reminds us of the 1970’s energy crisis that created challenges and opportunities for the electric cooperatives. The electric cooperatives continue to address similar challenges and opportunities stemming from current politics, potential regulatory requirements, energy policies and other influences.

The influences of forty years ago initiated an interest and need for energy efficiency education and awareness. The electric cooperatives business philosophy, model and principles require AECC to explore, learn and teach our members how they can take charge of their utility bills, home comfort and how to wisely utilize electricity.

Teaching members about energy efficient components, measures and proven building science empowers them with knowledge to manage their utility bills and improve personal comfort within their homes.

A core electric cooperative business principle requires AECC to provide safe, reliable and affordable electricity to those we serve. Additional core principles are commitment to community and education and training. The Electric Cooperatives of Arkansas will continue to include energy efficiency awareness and education in future work plans. The following report identifies those areas and provides an update during 2012.

Residential Energy Audits

Participating electric distribution cooperatives offer varying energy audit programs. Some offer walk-through and checklist inspections. Others offer comprehensive audits including blower-door tests, duct blaster leakage tests and infrared thermography for verification of air infiltration and thermal analysis. For visual reference, some incorporate a theatrical fog device that is used in conjunction with the duct blaster.

AECC’s Manager of Residential Energy Marketing is available to assist all distribution cooperatives with comprehensive energy audits when
requested. He is a Building Performance Institute (BPI) credentialed Building Analyst. He is also certified by the FLIR Infrared Training Center as a Level I and Level II Thermographer. (Exhibit One)

The following electric cooperatives received energy audit assistance in 2012:


Audit results and a prescriptive list of retrofit or repairs are left with each homeowner. The local electric cooperative retains the test results. When requested, the hosting cooperative may offer reputable resources to repair or retrofit each component or measure on the list.

Blower-Door and Infrared Equipment

AECC maintains two sets of Energy Conservatory blower-door diagnostic equipment with DG-700 computers and Tech-Tite software operating systems. AECC also has one Energy Conservatory duct-blower unit and maintains two FLIR B40, one FLIR B360, and one FLIR T640 infrared cameras. Qualified and trained personnel from the electric distribution cooperatives may borrow the diagnostic equipment and FLIR infrared thermal imaging cameras through an equipment loan program.

AECC utilizes the FLIR Tools iPad application when conducting residential energy audits. The homeowner can monitor the thermal imaging process of the energy audit by simply viewing the iPad screen. Bluetooth wireless technology allows the energy auditor to transmit the infrared images to the iPad from the FLIR T640 camera. Images may be saved and included in leave-behind reports. A video feature is also available for problem resolution, teaching, media, etc.

Comprehensive Training and Certification
AECC is committed to training, education and information. Staying on the cutting edge of building science technology and providing the proper training to representatives at the electric distribution cooperative level remains an annual goal.

A key benefit of this training directly impacts the electric cooperative membership. Since electric cooperatives are local, its members have direct contact with knowledgeable employees that reside in their hometown or proximity.

**FLIR Level II Certified Thermographer**

The FLIR Infrared Training Center Level II infrared thermography training course was held December 11-14, 2012. The training is designed for the practicing Level I thermographer who is interested in more advanced infrared training. This infrared training course focuses on strengthening and improving knowledge about thermography skills for building sciences, infrared physics, heat science, electrical applications, predictive maintenance applications, IR reporting, image analysis and more. Level II infrared thermography training students must have successfully completed a Level I thermography training course. Attendees completing Level II infrared course requirements and a thermography field assignment will receive an ITC Level II thermography certification.

Certification credentials require successful completion of course requirements, passing a written exam, and submission of a case study field assignment.

The following are FLIR Level I Thermographers:

- Bret Curry-AECC
- Doug Brandon-First
- Anthony Galloway-First
- David Hannah-First
- David Copeland-First
- Nick Manatt-Clay Co.
Lyndal Hutsell-Clay Co.
Alan Ferguson-Ouachita
Aaron Mantooth-Arkansas Valley
Joe Magnini-Carroll
Brian Ayers-Carroll
Brian Wise-Carroll
Mike Jones-Carroll
Dale Smith-Petit Jean

The following earned FLIR Level II Thermographer Credentials in 2012:

Bret Curry-AECC
Dean Mullins-AECC
David Gaskin-AECC
Aaron Mantooth-Arkansas Valley
Brian Ayers-Carroll
Joey Magnini-Carroll
Brian Wise-Carroll
John Via-First
Shawn Dorflinger-Ouachita
Keith Kaderly-Ozarks
James Reid-Ozarks
Dale Smith-Petit Jean

Building Performance Institute-Building Analyst Credentials

The Building Performance Institute (BPI) is a recognized leader in developing and supporting high quality energy audit training courses. BPI training is recognized by Energy Star, the Department of Energy and numerous electric utilities.

BPI Building Analysts recognize that the house is a system and most construction components are interconnected. The relationship between all interconnected systems of the house is the key to its overall performance, efficiency, and durability. Moreover, home performance is essential to the health, safety, and comfort of occupants. Certified BPI professionals are trained to quickly target, diagnose, and solve household performance
problems such as high utility bills, air infiltration, mold, mildew and ice dams to name a few.

BPI Building Analysts understand the principles of energy and building science, the energy process, the building shell and thermal envelope, air flow, moisture management, air quality, combustion safety and carbon monoxide monitoring, HVAC-Lighting-Appliance-Domestic Hot Water as building systems and diagnosis of common building problems, blower-door and duct blaster testing and combustion appliance testing.

The following individuals are certified BPI Building Analysts:

Bret Curry-AECC
Joey Magnini-Carroll Electric
Brian Wise-Carroll Electric
Doug Brandon-First Electric
David Copeland-First Electric
Anthony Galloway-First Electric
David Hannah-First Electric
Keith Kaderly-Ozarks Electric
James Reid-Ozarks Electric
Dale Smith-Petit Jean Electric
Jerry Pleasants-Woodruff Electric

Commercial & Industrial Energy Efficiency and Audits

Twelve commercial and industrial energy audits were conducted and/or completed in 2012. AECC Manager of Economic Development facilitates third party audits on behalf of the electric distribution cooperatives.

These third party audits are designed to take a comprehensive look at the facility and make recommendations for improved energy efficiency measures. Prior to the audit, data is collected concerning the physical characteristics of the facility and energy usage. Then a detailed walk-through/tour of the facility is conducted. Following the analysis, a report is produced for the company highlighting various recommendations for decreased waste and improved efficiency. These may involve lighting, HVAC, windows, boilers/chillers, processes, etc.
Auditing Firms:

Building Design Services (BDS)

John Reed, Auditor
Bachelor of Science in Electrical Engineering University of Arkansas Fayetteville, Arkansas 1981
Industry Experience: 30 years
Professional Registration:
Registered Engineer Arkansas No. 6552 Georgia No. PE018986 Idaho No. 15232 Missouri
No. 025447 Mississippi No. 14732 Tennessee No. 21334 Washington No. 49859
Certified Energy Manager (CEM)
Organizations: Association of Energy Engineers (AEE)

BDS is an engineering and design firm specializing in energy efficient designs of commercial, institutional, and governmental projects. BDS offers a wide range of services including, design and construction documents; energy analysis and planning.

- Geothermal Design

BDS is considered a leader in the analysis and design of geothermal heating and cooling systems for commercial projects for the mid-south. Geothermal (sometimes called geo-exchange) is an exciting technology that saves valuable energy and helps preserve the environment. However the BDS mechanical department also has experience in virtually every major HVAC system and if geothermal is not a good fit BDS is capable of engineering the best system for the specific project.

- Electrical Design

Lighting and Power has been a mainstay of the BDS electrical department. Experience in fire alarm, security, power quality, telecommunications and energy conservation have also become an important facet of the company.

- Experience

The BDS staff experience covers over 60 years of design and project supervision. BDS is accustomed to working with contractors, owners and other design professionals.
They have done work on commercial, institutional, governmental, industrial, office and retail environments.

*Power Energy Strategies*

David Earl Lisenbee, PE, CEM, CRM
674 Sexton Creek Road South
Heber Springs, AR 72543
501-351-4970

- **Summary**

  David Lisenbee is a registered Professional Engineer in the States of Arkansas and Mississippi. He is a Certified Energy Manager and Carbon Reduction Manager. He has conducted over 100 energy audits under contract for the Arkansas Energy Office of the Arkansas Industrial Development Commission.

  He has represented the Arkansas Manufacturers Association as an energy consultant on energy related matters where he developed and presented an energy seminar for AMA members and non-members on energy management and energy procurement.

  Mr. Lisenbee has developed and issued a Request for Proposal (RFP) for a national retail chain for procurement of energy for 325 stores in 28 states. He also has experience in developing strategic energy plans tailored to meet end users specific energy needs.

  He has been very involved in business development where he has established partnerships with business associates and managed projects from sales to measurement and verification. His 30-year career has encompassed business development, engineering, project management and customer service. His involvement in the energy industry has allowed him to develop an extensive network of engineering and energy associates including energy efficiency equipment suppliers, power marketers, natural gas marketers and energy professionals. He has worked with utilities across the nation and developed special “negotiated contracts” for clients. He has worked for and with design engineers on electrical, HVAC and energy related projects.
• Professional Registration

Registered Engineer - State of Arkansas, Certificate No. 8032
Registered Engineer - State of Mississippi, Certificate No. 10329
Certified Energy Manager, CEM No. 9942
Carbon Reduction Manager, Certificate No. 195

2012 C&I Audits

• Big Star Grocery (First Electric Cooperative Corporation)
• South Central Educational Cooperative (Ouachita Electric Cooperative Corporation)
• American Polishing (North Arkansas Electric Cooperative Corporation)
• Hillcrest Public Schools (Craighead Electric Cooperative Corporation)
• Parker Hannifin (First Electric Cooperative Corporation)
• Hot Springs Village Property Owners Association (First Electric Cooperative Corporation)
• Phillips Community College DeWitt (First Electric Cooperative Corporation)
• Winrock/Petit Jean (First Electric Cooperative Corporation)
• ASU-Heber Springs (First Electric Cooperative Corporation)
• Knight’s Grocery (First Electric Cooperative Corporation)
• Circle of Life Hospice (Ozarks Electric Cooperative Corporation)
• Arkansas Parks & Tourism/Petit Jean (First Electric Cooperative Corporation)

Website Based Energy Efficiency Information, Communications & Collateral

Website Visitors

The www.aecc.com and www.ecark.org website averaged 9,546 visits per month in 2012. The total visits for the year were 114,557 with May being the peak month with 14,225 visits. This surge is attributed to the Energy Efficiency Makeover contest promotional campaign.

Rural Arkansas Living e-newsletter

In June 2009, the Electric Cooperatives of Arkansas launched an “opt-in” electronic newsletter, Arkansas Living. The newsletter is e-mailed to “opt-in” subscribers prior to the mailing of the print version. This medium was available throughout 2012.
The e-newsletter highlights key areas of the publication and provides a link to the flipping book version of the magazine. The newsletter has 3,000 opt-in subscribers. Subscriptions increased during June, July and August when the application process for the Energy Efficiency Home Makeover was underway.

The *Arkansas Living* e-newsletter is archived on the www.ecark.org website. This medium provides additional access to energy efficiency information printed in the magazine. (Exhibit Two)

*Arkansas Living Social Media*

*Arkansas Living* magazine and the Electric Cooperatives of Arkansas launched social media efforts in 2012 with energy efficiency messages being a focal point for messaging. The mediums were Facebook, Twitter and YouTube. The *Arkansas Living* Facebook page is [https://www.facebook.com/ArkansasLivingMagazine](https://www.facebook.com/ArkansasLivingMagazine). Energy efficiency articles mentioned in the magazine were spotlighted on the page throughout the year. The page has approximately 900 “Likes”. The cooperative’s YouTube channel is [http://www.youtube.com/RuralArkLiving](http://www.youtube.com/RuralArkLiving). During Makeover 2012 staffers delivered weekly video updates regarding the progress of the makeover project. These videos included educational information to show viewers energy efficiency applications.

*Website Resources*

A wide array of energy efficiency tools and tips are available with the site and a unique URL is promoted also: [www.smartenergytips.org](http://www.smartenergytips.org). The URL is the warehouse for energy efficiency data. The site averaged 1,352 visits per month with a total of 16,222 for 2012. The month of peak visits was June with 3,955. It should be noted that this was during the media campaign for the 2012 Energy Efficiency Home Makeover. Participating distribution cooperatives and AECC continue to offer and host a wealth of energy efficiency information and resources online. Information includes:

- Intuitive energy usage calculators including heat pumps, lighting and televisions
- Appliance usage calculators
Do-it-yourself audits
101 energy saving tips
Doug Rye's weekly radio show MP3's and iTunes Podcasts
Marathon water heaters
General Electric “Geo-Spring” hybrid water heater
Energy efficiency “Makeover” program
Energy efficient model home program
CFL energy saver
Water heater energy saver
HVAC energy saver
How to read an electric meter
Commercial energy efficiency guide
Old appliance information
Energy Star information
Green Power
Renewable energy
LED Christmas lighting information
Guide for where energy dollars are spent
Silent plug loads/standby power and more...
The website is also a repository for all “image” and “energy efficiency” television and radio spots. For complete website details and to view all television commercials and listen to radio spots visit www.aecc.com or www.smartenergytips.org (Exhibit Two)

Web Based Real-Time Hydroelectric Power Generation

The Electric Cooperatives of Arkansas completed the first of three hydropower plants on the Arkansas River in one of their most ambitious generation projects ever in December of 1988.

The plant, the Clyde T. Ellis Hydroelectric Generating Station, was built at the James W. Trimble Lock and Dam near Fort Smith. It marked the cooperatives' commitment to a long-term, low-cost power source for their members, as well as their dedication to environmentally friendly power, long before it was fashionable to do so. Later in the 1980s and 90s, the cooperatives completed two other hydropower plants, making the total investment in renewable energy resources at about $330 million.
Daily, monthly and lifetime cumulative generation output totals from AECC’s hydroelectric power plants are available real-time to all cooperative members and the general public at: [http://www.aecc.com/renewable-resources/hydroelectric-power/](http://www.aecc.com/renewable-resources/hydroelectric-power/) (Exhibit Three)

**Web Based Real-Time Solar Power Generation System**

The Electric Cooperatives of Arkansas are testing another source of renewable power generation – solar energy. In early 2009, solar panels were installed as part of a pilot program to test small-scale solar power systems. Prefomed Line Products installed the system, which has 33 panels at a cost of approximately $47,000. In addition to the panels, the system has an inverter that converts the DC power produced by the panels to AC power that is used in the AECl Utility Sales building. The system has a generation capacity of 7kW.

Daily, monthly and lifetime cumulative generation output total for the solar project is available real-time to all cooperative members and the general public at: [http://www.aecc.com/renewable-resources/solar-power/](http://www.aecc.com/renewable-resources/solar-power/) (Exhibit Four)

**Informational Brochures**

AECC’s marketing collateral includes an array of energy efficiency brochures. AECC offers a mix of brochures that are customizable for individual electric cooperatives if requested. The following energy efficiency brochures are available in each cooperative main and district offices:

Energy Efficiency
- General Electric GeoSpring hybrid electric water heater
- Compact Fluorescent Lighting
- Energy Efficiency In A Manufactured Home
- Marathon Water Heaters
- Airs Source Heat Pumps
- Geothermal Heat Pumps
- Building Guidelines for Energy Efficiency

Copies of the brochures are attached. (Exhibit Five)
2012 Energy Efficiency Calendar

A 2012 energy-efficiency themed calendar was created for statewide distribution to all cooperative members. Statewide membership received a calendar with their January 2012 edition of Arkansas Living magazine. Also, all seventeen cooperatives participated in the distribution of the calendar through their local and district offices. Each month contained energy savings tips and educational information. (Exhibit Six)

Doug Rye Radio Show Sponsorship & Consulting Services

"Home Remedies" Radio Show Sponsorship


The Electric Cooperatives of Arkansas have been the presenting sponsor of this statewide radio program for over a decade. However, declining broadcast coverage by the network and a cost-benefit analysis revealed our investment into energy efficiency education was better served with other mediums.

Doug Rye Energy Efficiency Consulting Services and Seminars

The Electric Cooperatives of Arkansas has a memorandum of understanding with Doug Rye to serve as an energy efficiency consultant and underwrite sponsorship of numerous energy efficiency educational seminars throughout the state. The co-ops have utilized Rye’s expertise for years to promote total electric energy efficient retrofit and new home construction, Marathon and GE GeoSpring Hybrid water heaters, heat pumps, and geothermal technology.

During 2012, Arkansas electric distribution cooperatives continued to host his popular energy efficiency educational seminars. A total 19 seminars were
held in 2012. Attendance varies from city to city. Yet, it’s not uncommon for attendance to reach 100+ per seminar.

2012 DOUG RYE SEMINARS, MODEL HOME OPEN HOUSES AND OTHER RELATED ACTIVITIES

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<td>BERRYVILLE</td>
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Total Attendance 1073

During 2012, Rye received hundreds of energy efficiency related telephone calls from cooperative members. He is also directly responsible for the referral of several high-efficiency Marathon electric water heater sales annually. Doug also endorses and promotes the Energy Star rated General Electric Geo-Springs hybrid water heater, which has an energy factor (EF) 2.3.
Rye’s energy efficiency consulting services and educational energy seminar programs are part of AECC’s overall 2013 energy education work plan.

Doug Rye Model Home Program

Promotion and education of energy-efficient heat pumps, energy-efficient home construction, technologies and appliances has been an important goal of the electric cooperatives for decades.

The Doug Rye model home program began in 1998 and is a collaborative effort between the electric cooperative member homeowner, their builder and their local electric cooperative. The program requires the cooperative member and builder to consider the home as an integrated energy-efficient system rather than a random assortment of building materials. The model home is an excellent educational tool for marketing all-electric, ultra energy-efficient homes.

During construction, the energy auditor from the host electric cooperative and AECC’s manager of residential energy marketing monitors each component and measure within the home. Once satisfied the component is installed properly, the auditor photographs and video documents for future teaching opportunities.

The model home provides an important resource to member owners, homebuilders and related trade allies about the construction of energy-efficient homes, the use of heat pumps, energy-efficient appliances and properly installed measures and components.

Arkansas Valley, Ozarks and Craighead Electric Cooperatives sponsored homes in 2012. All were in local "Parades of Homes" events to feature the energy efficiency components. All three model homes were part of the open house weekend that hosted hundreds of interested visitors. Some visitors even drove in from neighboring states.

With 29 total homes built since its origin, the model home program continues in popularity. And with the continuing importance of energy efficiency education and awareness, we recommend retaining this successful program in 2013.

For complete details about the model home program visit:

http://www.aecc.com/energy-efficiency/model-home-program/

Doug Rye Arkansas Living Column

Doug Rye provides a building science and energy efficiency column to the Arkansas Living magazine. The column is shared among 30+ electric cooperatives around the
Doug Rye Says on www.aecc.com

### Jan-12

<table>
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### Oct-12

country. The ECA website is a repository for previous columns. To read previous columns visit: [http://www.aecc.com/energy-efficiency/doug-rye/doug-ryes-column/](http://www.aecc.com/energy-efficiency/doug-rye/doug-ryes-column/)
## Promotion of Energy Efficient Appliances and Products

### Marathon Energy Efficient Water Heaters

Marathon, a subsidiary of Rheem, is a manufacturer of energy efficient electric water heaters. The Marathon design has been on the forefront of efficient units for years. Their hot water storage tanks are insulated with six inches of open-cell foam insulation on both the top and bottom. The sides are also insulated with three inches of open-cell foam insulation. Units range from 40-105 gallons and have an Energy Factor rating of .91-.95 depending on the unit.

The Marathon is a perfect storage medium when used in conjunction with a geothermal domestic hot water/desuperheater feature. Some Arkansas electric distribution cooperatives install a load control device as part of their ongoing demand response program.

All of the AECC electric distribution cooperatives promote use of this specific brand. Most offer them for sale locally or promote availability from Arkansas Electric Cooperatives, Inc., (AECI) Utility Sales & Services division located in Little Rock. AECI Utility Sales and Services lead the nation in Marathon water heater sales within their five state service territory. This is attributed to continuous promotion of all components of energy efficiency via Arkansas Living Magazine, Doug Rye’s efforts, ECA website information, brochures and earned media events.

### General Electric Geo-Spring Hybrid Heat Pump Water Heater
Initially, ECA was chosen as one of nine electric utilities nationwide to partner with General Electric to promote and sell their new industry-exclusive GE GeoSpring™ Hybrid Electric Water Heater. The unit is designed to provide the same hot water homeowners are accustomed to, but requires only about half the energy to produce it. For example, based on the same standard tank water heater that uses approximately 4800 kWh per year, the new GE GeoSpring™ Hybrid Water Heater is designed to:

1. Consume up to 62% less energy than a standard electric water heater
2. Result in energy savings of $320 per year

*Based on DOE test procedure and comparison of a 50-gallon standard electric tank water heater using 4881 kwh per year vs. the GE heat pump water heater using 1856 kwh per year.

The GE GeoSpring™ Hybrid Water Heater combines energy-saving heating technology with traditional electric heating systems used in most standard water heaters on the market today without sacrificing the amount of hot water it can deliver.

This hybrid technology is designed to absorb heat in ambient air and transfer it into the water. Since it requires much less energy to absorb and transfer heat than it does to generate it – as a standard electric water heater would – the GE GeoSpring™ Hybrid Water Heater provides the same amount of hot water while using less energy.

The GE GeoSpring™ Hybrid Water Heater features a user-friendly electronic control system that offers both simplicity and flexibility, giving consumers as much or as little control of operating modes as they like. Water temperature may be precisely set from 100 to 140 degrees to maximize energy benefits and comfort. The unit exceeds the ENERGY STAR® minimum requirement of a 2.0 energy factor (EF) with a 2.35 EF or 235% efficient.

Similar to Marathon, the General Electric GeoSpring unit is available for purchase to all electric cooperative members through their local electric cooperative or the AECl Utility Sales Division.

During 2012, the electric cooperatives also promoted the Federal energy tax credit and the Arkansas Energy Office Energy Star rebate programs.

Air Source & Geothermal Heat Pump Information

All of the AECC electric distribution cooperatives promote use of air-source and geothermal heat pumps. Cooperatives offer information with brochure marketing collateral and personal one-on-one consultation with members.

AECC is a current and longtime member of the Arkansas Heat Pump Association.

AECC also promotes and endorses cost-benefit analysis of air-source versus geothermal installation, consideration of the geothermal Federal 30% tax credit, desuperheater feature water heating, all state tax credits and annual energy efficiency Federal tax credits.

Compact Fluorescent Lamp Programs

All of the AECC distribution cooperatives promote the use of compact fluorescent lighting. Some offer sale of the product from their local and district offices. Some have implemented creative promotional and distribution campaigns.

LED Lamp Technology

All of the AECC distribution cooperatives are promoting the emergence of LED lighting technology. Many have LEDs installed in test applications. Work in progress.

Educational Mediums & Programs

Building Guidelines for Energy Efficiency Booklet

The Electric Cooperatives of Arkansas published the first edition of this booklet in 1997. The informational booklet was written to provide energy efficiency guidelines and measures for builders, sub-contractors and homeowners. Proper installation of components into a new or existing home will provide energy savings; improve comfort and lower utility bills. ECA promotes the idea that it is far more cost effective to incorporate energy efficiency measures into a new home, than to add them after construction has been completed.

The booklet is available from AECC and any distribution cooperative. Over 7000 copies have been distributed since 1997.

The booklet underwent a complete revision in 2011. The new version includes current building science endorsed by industry experts.

The latest edition is available online or a printed version is available at every local electric cooperative office. http://aecc.com/energy-efficiency/building-guidelines/ (Exhibit Seven)
Arkansas Living Magazine

The Electric Cooperatives of Arkansas promote energy efficiency practices, measures, components and appliances via the cooperatives' statewide magazine, Arkansas Living. The publication is the largest circulated publication in Arkansas as it is distributed to approximately 383,000 readers each month.

Energy efficiency is promoted within the publication via news articles, advertisements, social media and web-based methods.

Energy efficiency topics were covered in 34 articles, or approximately 2.8 articles per month. The articles range from easy do-it-yourself tips and general information to comprehensive energy efficiency messages. Each month the magazine includes a column by Doug Rye on a variety of energy efficiency tips. This column also runs in cooperative publications across the United States as the Electric Cooperatives of Arkansas provide the columns to the other electric cooperatives across the nation free of charge. The columns are archived at: http://www.aecc.com/energy-efficiency/doug-rye/doug-ryes-column/ (Exhibit Eight)

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<thead>
<tr>
<th>Month</th>
<th>Article</th>
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<tbody>
<tr>
<td>January</td>
<td>It's Pretty Easy to Lower Your Heating Bill</td>
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<td></td>
<td>EAST Students Take the Challenge</td>
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<tr>
<td>February</td>
<td>Make the Switch to CFLs</td>
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<tr>
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<td>Right-size Your Home's Heating and Air Conditioning</td>
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<td>Don't Fall for Energy Saving Scams</td>
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<td></td>
<td>Keeping It Simple</td>
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<td></td>
<td>Manufactured Savings to boost energy efficiency of mobile homes</td>
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<td>March</td>
<td>ENERGY STAR-rated Appliance Rebate is Back</td>
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<td>It's All about the Sun</td>
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<td>April</td>
<td>Energy Efficiency's Cutting Edge</td>
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<td>Co-Op Energy Auditors Receive Infrared Thermography Training</td>
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<td>Give Your Air Conditioning Some TLC</td>
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<td>Save Energy at Work</td>
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<td>The Science of Conduction</td>
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<td>May</td>
<td>It's Time to Apply for the Energy Efficiency Makeover</td>
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<td></td>
<td>The Science of Conduction (Part 2) and Convection</td>
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<tr>
<td>June</td>
<td>The Science of Radiation</td>
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July
There’s Still Time to Apply for the Energy Efficiency Home Makeover
Appliance Innovations
Cooling off the Attic

August
Bigger Bills Because of the Box
The Attic is Still Hot
Washing Gets Efficiency Boost

September
Palestine Couple Wins Energy Efficiency Makeover
Now Get Ready for This Winter and Next Summer

October
Beyond Coal, Beyond Gas, Beyond Nuclear...and Beyond Affordable
From Hot Attics to Frost
The Speed of Light(ing)

November
LED-Strung Christmas Trees: Going Fast!
Dishwasher Uses Less Water Than Hand Washing
More Efficient and Safer
Energy Efficiency Makeover Transforms Palestine Home

December
New Year’s Resolution: Save Energy
Let’s Just Do It...Others Have!

Website

The [www.aecc.com](http://www.aecc.com) and [www.ecark.org](http://www.ecark.org) website averaged 9,546 visits per month in 2012. The total visits for the year was 114,557 with May being the peak month with 14,225 visits.

A wide array of energy efficiency tools and tips are available with the site and a unique url is promoted also: [www.smartenergytips.org](http://www.smartenergytips.org). The url is the repository for energy efficiency educational and awareness information. The site averaged 1,352 visits per month with a total of 16,222 for 2012. The month of peak visits was June with 3,955. It should be noted that this was during the media campaign for the 2012 Energy Efficiency Home Makeover.

Social Media

*Arkansas Living* magazine and the Electric Cooperatives of Arkansas launched social media efforts in 2012 with energy efficiency messages being a focal point for messaging. The mediums
were Facebook, Twitter and YouTube. The Arkansas Living Facebook page is https://www.facebook.com/ArkansasLivingMagazine.

Energy efficiency articles mentioned in the magazine were spotlighted on the page throughout the year. The page has approximately 900 “Likes”. The cooperative’s YouTube channel is http://www.youtube.com/RuralArkLiving. During Makeover 2012, weekly video updates regarding the progress of the makeover project were posted on the site. These videos included educational information to show viewers how they can affordably implement many of the makeover components and measures.

**ERC Loan Programs**

Energy Resource Conservation (ERC) loans are available from participating electric distribution cooperatives at low interest rates. ERC loans can be used to finance energy-saving devices and heating, ventilation and air-conditioning systems. Loans are available for weatherization improvements including: attic insulation, floor insulation, wall insulation, water pipe wrap, duct wrap, duct sealing, caulking and weather-stripping, ground cover for crawl space, attic ventilation, window and door replacement, storm doors and windows and minor repair work associated with installation.

**The Magic of Energy Efficiency Educational Magic Show**

- **Overview of Program**

  The Electric Cooperatives of Arkansas offer a very successful Making Accidents Disappear program to school age children. The program has stressed electrical safety to millions of children in Arkansas and across the United States since 2003.

  In 2011, the show added a very simple energy efficiency message for your children. The message stressed turning off appliances and lights when not in use, or asking their parents to do so. Additionally, a magic program to promote energy efficiency to consumers was launched in 2009.

  The program, The Magic of Energy Efficiency stresses the consumer’s can save energy, save money and live comfortably by following a few energy efficiency tips. The message is intertwined with a wonder array of magic that empowers to consumers to see real results.

- **Messages**


21
Practicing proven energy efficiency is more than a popular trend. Paying attention to responsible electricity use and consumption can help to preserve resources, save money and improve comfort in homes and businesses.

- **Components and Measures**

  **Lighting**
  Replace traditional incandescent light bulbs with energy-efficient compact fluorescent bulbs which are up to four times more energy efficient and last nine times longer than incandescent bulbs. You could save up to $57 in electricity costs over the life of each bulb. Turn off lights in rooms you aren’t using, or install timers or occupancy sensors to reduce light consumption.

  **Heating & Cooling**
  Service accordingly. Have heating and cooling systems tuned up in the fall and spring. Make sure ductwork is intact and sealed properly. Clean or replace filters on air conditioners and heat pumps regularly. Use an air conditioner with a seasonal energy efficiency ratio (SEER) of 13 or higher. Use the proper size for your home.

  If building a new home, consider installing an energy efficient geothermal system to cool and heat the home. Contact a reputable HVAC contractor to properly size the unit required for your home. Insulate. Make sure insulation levels are appropriate in the attic, exterior and basement walls, ceilings, floors and crawl spaces.

  One can increase the comfort of their home and reduce annual heating and cooling usage up to 10 percent just by investing in proper insulation—cellulose is recommended—and sealing air leaks. Ceiling fans can bring energy saving benefits to the home. Most ceiling fans use only about as much power as a 100-watt light bulb. When used properly, ceiling fans can save money on utility bills year-round.

  **Appliances**
  Replace aging, inefficient appliances with Energy Star appliances. Look for the Energy Star label to select energy-efficient models. Energy Star models use much less power than their counterparts.

  Wash full loads of laundry using cold water when possible. Don’t over-dry clothes, and clean the dryer’s lint filter after every load to maximize air circulation.

  Use the energy-saving settings on refrigerators, dishwashers, washing machines and clothes dryers. Air-dry dishes by opening the dishwasher instead of using the heated drying cycle.
Keep your refrigerator or freezer at recommended temperatures of 37° to 40°F for the refrigerator and 5°F for the freezer. Clean the coils regularly.

Cook smarter! Match the size of the pan to the heating element. Use electric pans, toaster ovens or microwaves for small meals. Using the right size pans uses less energy and reduces cooking time.

Turn off the television when no one is watching. Today’s state-of-the-art, high definition sets offer amazing high-definition, but may use more electricity than older televisions. Use power strip cords and turn off when not in use. Shut down the computer. Conserve energy by turning off or using sleep mode for computers not in use for two hours or more. Use power strip cords and turn off when not in use.

Water Heater
Set the temperature on water heaters to 120°F, and install an insulating blanket on the water heater (which should pay for itself in less than a year.) Consider replacing old units with a lifetime warranted, high energy-efficient Marathon water heater and save up to $100 per year. Take a shower. In most households, it uses far less hot water than bathing.

List of Program, Location and Number of Attendees

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1 program on 2/14/12 at Bradley Elementary for SWREA 221
1 program on 2/14/12 at Taylor Elementary for SWREA 185
1 program on 2/15/12 at Trinity Christian School for SWREA 170
1 program on 2/15/12 at Union Elementary School for SWREA 305
1 program on 2/16/12 at Wilmot Elementary School for Ashley Chicot 135
1 program on 2/16/12 at Portland Elementary School for Ashley Chicot 202
1 program on 2/17/12 at Springhill Elementary School for SWREA 255
1 program on 2/20/12 at Saratoga Elementary School for SWREA 120
1 program on 2/20/12 at Nashville Mennonite School for SWREA 50
5 programs on 2/21/12 at Genoa Elementary School for SWREA 407
1 program on 2/22/12 at Woodlawn Elementary School for C&L 296
1 program on 2/23/12 at DeQueen Elementary School for SWREA 205
1 program on 2/23/12 at Wickes Elementary School for SWREA 344
1 program on 2/24/12 at Horatio Elementary School for SWREA 448
1 program on 2/24/12 at Lockesburg Elementary School for SWREA 195
1 program on 3/19/12 at Twin Rivers Assisted Living for South Central Electric 40
1 program on 3/26/12 at Northside Elementary in Cabot for First Electric 420
2 programs on 3/27 at Sheridan Elementary for C&L Electric 579
1 program on 3/27/12 at Maumelle Scout Meeting for First Electric 100
1 program on 3/28/12 at Perryville Elementary for First Electric 514
1 program on 3/28/12 at Ola Elementary for First Electric 307
2 programs on 3/29/12 at Heber Springs Elementary for First Electric 810
1 program on 3/30/12 at Stagecoach Elementary in Cabot for First Electric 300
1 program on 3/30/12 at Mountain Springs Elementary in Cabot for First Electric 200
2 programs on 4/9/12 at Garret Memorial Christian School for SWREA 184
2 programs on 4/10/12 at Camden Fairview Intermediate for Ouachita Electric 353
2 programs on 4/30/12 at Mansfield Elementary for Arkansas Valley Electric 363
2 programs on 5/1/12 at Huntsville Primary for Carroll Electric 478
1 program on 5/2/12 at Folsom Primary for Ozarks Electric 285
1 program on 5/2/12 at West Fork Elementary for Ozarks Electric 537
1 program on 5/3/12 at Scott Elementary for First Electric 226
2 programs on 5/3/12 at Arnold Drive Elementary for First Electric 277
2 programs on 5/4/12 at Westside Elementary in Searcy for First Electric 613
1 program on 5/7/12 at Skyline Elementary in Harrison for Carroll Electric 461
1 program on 5/7/12 at Eagle Heights Elementary in Harrison for Carroll Electric 230
1 program on 5/8/12 at Jones Elementary in Rogers for Carroll Electric 489
2 programs on 5/8/12 at Allen Elementary in Siloam Springs for Carroll Electric 595
1 program on 5/9/12 at Gentry Primary for Carroll Electric 381
1 program on 5/9/12 at Arkansas Virtual Academy in Rogers for Carroll Electric 95
1 program on 5/10/12 at Huntsville Kiwanis for Carroll Electric 30
1 program on 5/10/12 at Eureka Springs Elementary for Carroll Electric 293
1 program on 5/11/12 at Jasper Elementary for Carroll Electric 288
1 program on 5/11/12 at Mount Judea Elementary for Carroll Electric 115
1 program on 5/14/12 at Nelson Wilkes Elementary for North Arkansas 325
2 programs on 5/14/12 at Hackler Intermediate for North Arkansas 300
1 program on 5/15/12 at Guy Perkins Elementary for First Electric 250
1 program on 5/16/12 at Foreman Elementary for SWREA 288
1 program on 5/17/12 at Oden Elementary for Rich Mountain Electric 157
1 program on 5/18/12 at Theodore Jones Elementary for First Electric 464
1 program on 5/18/12 at Ida Burns Elementary for First Electric 420
1 program on 5/21/12 at Calvary Baptist School for Arkansas Valley 35
2 programs on 5/22/12 at Alma Primary for First Electric 789
1 program on 6/11/12 at Arkadelphia Kids for South Central Arkansas Electric 45
1 program on 6/26/12 at Otter Creek Elementary Day Camp for First Electric 120
1 program on 7/3/12 at Little Rock Kiwanis for Arkansas Electric 45
1 program on 7/20/12 at Harrison Day Camp for Carroll Electric 55
1 program on 7/26/12 at A.T.U- Ozark Day Camp for Arkansas Valley Electric 62
2 programs on 8/27/12 at Cedar Park Elementary for Craighead Electric 729
3 programs on 8/27/12 at Fox Meadow Intermediate for Craighead Electric 369
2 programs on 8/28/12 at Harrisburg Elementary for Craighead Electric 466
1 program on 8/28/12 at Avondale Elementary for Craighead Electric 675
1 program on 8/29/12 at Nettleton Intermediate for Craighead Electric 400
2 programs on 8/29/12 at Brookland Elementary for Craighead Electric 905
1 program on 8/30/12 at BIC East Elementary for Craighead Electric 290
1 program on 8/30/12 at BIC West Elementary for Craighead Electric 297
2 programs on 8/31/12 at Lake City Elementary for Craighead Electric 263
1 program on 8/31/12 at Concordia Christian for Craighead Electric 62
1 program on 9/4/12 at Bearden Elementary for Ouachita Electric 220
1 program on 9/4/12 at Harmony Grove Elementary for Ouachita Electric 235
1 program on 9/5/12 at Westwood Elementary for Ozarks Electric 471
2 programs on 9/6/12 at Williams Magnet for First Electric 444
2 programs on 9/7/12 at Baseline Elementary for First Electric 324
2 programs on 9/7/12 at Collegeville Elementary for First Electric 465
1 program on 9/10/12 at Marvell Elementary for Woodruff Electric 292
2 programs on 9/11/12 at Centerpoint School in Amity for South Central Electric 164
1 program on 9/12/12 at Lonoke Primary for First Electric 468
1 program on 9/13/12 at Bale Elementary for First Electric 359
3 programs on 9/14/12 at White County Fair for First Electric 200
1 program on 9/17/12 at Root Elementary in Fayetteville for Ozarks Electric 542
2 programs on 9/18/12 at Butterfield Elementary for Ozarks Electric 477
2 programs on 9/18/12 at Prairie Grove Elementary for Ozarks Electric 375
2 programs on 9/19/12 at Elmdale Elementary for Ozarks Electric 656
1 program on 9/19/12 at Harp Elementary for Ozarks Electric 300
1 program on 9/20/12 at Elkins Upper Elementary for Ozarks Electric 353
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<td>Pocola Elementary for Arkansas Valley Electric</td>
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<td>Mount Judea Elementary for Carroll Electric</td>
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1 program on 11/27/12 at Deer Elementary for Carroll Electric 135
2 programs on 11/28/12 at Green Forest Elementary for Carroll Electric 385
1 program on 11/28/12 at Berryville Kiwanis for Carroll Electric 30
1 program on 11/28/12 at Clear Springs School for Carroll Electric 25
2 programs on 11/29/12 at Benton Co. School of the Arts for Carroll Electric 465
1 program on 11/29/12 at Old Wire Elementary for Carroll Electric 485
2 programs on 11/30/12 at Elm Tree Elementary for Carroll Electric 646
1 program on 11/30/12 at Frank Tillery Upper Elementary for Carroll Electric 200
1 program on 12/3/12 at Viola Headstart for North Arkansas Electric 20
1 program on 12/3/12 at Salem Headstart for North Arkansas Electric 24
1 program on 12/3/12 at Highland Headstart-East for North Arkansas Electric 18
1 program on 12/3/12 at Highland Headstart-West for North Arkansas Electric 20
1 program on 12/4/12 at Mayflower Elementary for First Electric 300
1 program on 12/5/12 at Mulberry Elementary for Arkansas Valley Electric 166
1 program on 12/5/12 at Milsap Elementary for Arkansas Valley Electric 70
1 program on 12/6/12 at Central Arkansas Christian for First Electric 250
1 program on 12/6/12 at Daisy Bates Elementary for First Electric 490
2 programs on 12/10/12 at Marmaduke Elementary for Craighead Electric 454
1 program on 12/11/12 at Mineral Springs School for SWREA 213
1 program on 12/12/12 at Gardner Magnet for South Central Arkansas Electric 528
2 programs on 12/13/12 at Geyer Springs Elementary for First Electric 271
1 program on 12/14/12 at Romine Elementary for First Electric 384
1 program on 12/18/12 at Julia Lee Moore Elementary for First Electric 402

Total Audience Count 53,883

Energy Efficient Home Makeover Project

- About the program

Each Sunday night ABC airs an exciting reality show called "Extreme Home Makeover." It's a race against time on a whole-home improvement project that would ordinarily take months to achieve. Teams of designers, along with hundreds of workmen and neighbors, have just seven days to completely renovate an entire house, including every single room, the exterior and landscaping for a deserving family nominated by friends and family. Many of the home makeover recipients have experienced catastrophic loss due to natural disasters or face some personal challenge.

AECC customized a similar format and created the "Electric Cooperatives of Arkansas Energy Efficiency Makeover" project. ECA members with all electric homes and who were in good standing with their local electric cooperative are qualified to submit an application. Print, radios and television advertisements
are used to promote the contest. In 2012, print ads were placed in *Arkansas Living* magazine, and a thirty-second television advertisement with the makeover contest details was aired over statewide television networks.

Applicants were required to complete an on-line or printed entry form listing general information about their home, each energy component within their dwelling, then attach a copy of their electric bill and a photograph of their home.

2012 marked the fifth year for this successful educational project. Approximately 2,000 applications were received from May-July. Finalists were chosen from each of the 17 distribution cooperatives. The field was narrowed down to three remaining applicants from a comprehensive and objective selection process. The three semi-finalists received a thorough energy audit of their homes and the winner was chosen from Woodruff Electric Cooperative.

The 2012, makeover project was a huge success and was featured in the September and October editions of *Arkansas Living* magazine.

The educational aspect was phenomenal and the earned media coverage exceeded our expectation. AECC continues to receive earned media from all three projects. Geo Outlook, a quarterly publication of Oklahoma State University and the International Ground Source Heat Pump Association featured the 2012 makeover project in their 2012, Q4 publication. The publication is a nationwide publication. (Exhibit Nine)

Civic, service clubs and homebuilder’s associations continue to request makeover project presentations.

AECC proposes to continue this successful program in 2013. A similar work plan will incorporate refurbishing the home, incorporating energy saving components and measures.

Details including the application, television spots, print ads and more can be reviewed at: [http://www.aecc.com/energy-efficiency/energy-efficiency-makeover/](http://www.aecc.com/energy-efficiency/energy-efficiency-makeover/)

- *Performance Details from the 2012 Makeover Project*

The 2012, makeover project was a 60 year old 1,800 square foot FHA ranch-style dwelling. The home had an old inefficient outdoor package HVAC unit. Reflective temperatures measured 120+ degrees in the location of the unit. The thermal barrier was in poor condition to non-existent. The windows were in
poor condition and the duct supply and return system had over 1-ton of tested leakage. The measured air-infiltration tested near 70%. Electric bills were averaging $250 and much higher during seasonal summer and winter months. AND...the home heating was supplemented with kerosene heaters.

The makeover consisted of a complete air-infiltration reduction package, insulation, new energy-efficient windows, Energy Star appliances, geothermal heat pump and a high-efficiency heat pump water heater. The combination of components and measures transformed the house into an energy efficiency marvel.

The comfort level of the home improved dramatically and the HVAC system is averaging an operating cost of $1.25 daily. The water heater is averaging $.50 daily. The overall average electric bill was reduced by sixty percent. Plus, the humidity levels are averaging 45-50 percent.

The 2012 Makeover

The 2012 winner was located between Palestine and Moro in rural Lee County. Qualified AECC and distribution cooperative personnel diagnosed the home and recommend applicable energy components and measures.

A blower door test was administered for pre and post-analysis purposes. The pre-makeover air-infiltration tested at .70 ACH. Post-makeover blower-door test revealed a forty-three percent reduction of .40 ACH.

Infrared thermal imaging technology was implemented by trained thermographers during the pre- and post analysis.

Energy Components and Measures

The home was built in the early 1950’s and consisted of little or no energy-efficient characteristics. Thus, the following energy-efficient components and measures were implemented:

1. Insulated the roof decking within the attic with bio-based open-cell foam. Also foamed the gable ends.
2. Insulated behind the brick veneer siding with RetroFoam.
3. Replace the windows with Low-E and U-value vinyl framed units.
4. Replaced old appliances with Energy Star units (Range, refrigerator, freezer, dishwasher, washer & dryer)
5. Installed Water Furnace Envision Geothermal ultra-efficient heat pump.
7. Converted lighting to CFL.
8. Repaired all storm doors and weather stripping.
9. Caulked and seal all accessible areas of air infiltration.
10. Caulked and seal inside building envelope.
11. Installed foam gaskets around all light switches and outlets.
12. Repaired fireplace flue.

Performance is still being monitored. Currently, the kwh consumption is averaging 50% to 60% lower following the makeover improvements.

Project Budget

2012 Energy Efficiency Makeover Expenses

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<tr>
<th>Name</th>
<th>Description</th>
<th>Expenditure</th>
<th>Value</th>
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<td>Rood HVAC</td>
<td>Geo Loop Installation, HVAC</td>
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<td>$13,000.00</td>
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<td>Water Furnace International</td>
<td>Envision Series V Geothermal</td>
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<td>General Electric</td>
<td>Energy Star Appliances</td>
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<td>General Electric</td>
<td>GeoSpring Hybrid Water Heater</td>
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<td>BPSi Foam Insulators</td>
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<td>Bldg mtls, lights, bulbs, etc</td>
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<td>Energy Star Replacement Windows</td>
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<td>$24,570.56</td>
<td>$51,211.88</td>
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Donated Materials for Makeover:

- 17, 50-gallon GE GeoSpring water heaters. One for the makeover project and one each for the 16 finalists
- Water Furnace-Envision geothermal heat pump
- WeatherBarr energy efficient windows

Public Service Commission Docket 06-004-R

In Order No. 12 issued in Docket No. 06-004-R, the Arkansas Public Service Commission (the “Commission”) called for utilities to take actions jointly with the Arkansas Economic Development Commission-Energy Office (the “AEO”) to design, construct, and fund a
statewide education program that has a consistent message promoting the efficient use of electricity and natural gas.

Pursuant to this action, the AEO and the participating utilities (collectively, the “Parties”) entered into a Memorandum of Understanding (the “First MOU”), which set forth the elements of a statewide education program that was named ENERGY EFFICIENCY ARKANSAS (“EEA”). The EEA’s purpose is to communicate and promote fuel neutral, cost effective energy efficiency information and programs. The Parties agreed that the EEA would be funded by the participating utilities and administered by the AEO.

The Parties jointly filed the first MOU for the Commission’s approval on July 2, 2007, in Docket No. 07-083-TF. The EEA Program proposed in the first MOU had programs and associated activities based on a total proposed budget of approximately $1.2 million. On September 19, 2007, the Commission issued Order No. 4 in Docket No. 07-083-TF, which directed the Parties to revise and refile the EEA Program plan with the Commission based on a total budget of $2.4 million. Consequently, the Parties entered into an amended MOU, which was approved by the Commission in Order No. 5, in Docket No. 07-083-TF, on November 16, 2007.

AECC’s contribution to the EEA program in from January 1, 2009 through June 30, 2010 was $246,784. The prorated amount through June 2010 was $82,261 and the contribution for July 1, through December 31, 2010, was $95,605. A total of $177,866 was contributed in 2010. AECC’s contribution in 2011 was $112,463 in 2011. $139,215.20 was contributed in 2012 (Exhibit Ten)

AECC’s contribution to the Frontier Deemed Savings report in 2012 was $27,572.44. (Exhibit Eleven)

AECC contributed $30,000 to the Arkansas Energy Office and the Arkansas Homebuilders Association in their joint quest to provide “Energy Code Classes” throughout the state. (Exhibit Twelve)

Energy Efficiency Program Expenditures

2012 Energy Efficiency Expenditures

<table>
<thead>
<tr>
<th>Name</th>
<th>Expenditure</th>
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<td>Doug Rye’s Home Remedies Radio Show Sponsorship</td>
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<td>Doug Rye Consulting Services</td>
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<td>Marathon Water Heater Advertising</td>
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<td>Arkansas Living EE &amp; Makeover Print Advertisement</td>
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2012 Makeover/Promotional Ideas $4,146.76
2012 Makeover Project Expenses $51,212.00
General EE Ads, Makeover Creative and Placement, $247,257.00
Calendars, Misc. EE Advertising/Education $10,000.00
Commercial & Industrial Energy Audits $60,084.50
Contribution to EEA Program-AR Energy Office $139,215.20
Deemed Savings Report Contribution/Frontier $27,572.44
FLIR Training & Certification $17,000.00
Arkansas HVACR $500.00
Rock River/Roby Brock/Talk Business/EE Ad $12,000.00
Safety & The Magic of Energy Efficiency Shows $86,790.42

Total Investment $939,316.06

**AECC’s Demand Response**

The Electric Cooperatives of Arkansas, consisting of Arkansas Electric Cooperative Corporation ("AECC") and its seventeen member cooperatives¹, have been the most aggressive and successful utility system in the nation with regard to offering and implementing demand response programs.

The Electric Cooperatives' success in demand response has been achieved through many years of steady effort. In 1978, certain member cooperatives began using clock timer switches to control water heaters and irrigations loads. Clock switches were eventually replaced by radio-controlled load switches. As demand response became more prevalent, a statewide System Control and Data Acquisition ("SCADA") system was installed to provide the Electric Cooperatives with more sophisticated and timely load data. The receipt of virtually instantaneous data allowed the Electric Cooperatives to more surgically direct their demand response efforts.

The Electric Cooperatives continue to maintain their state-of-the-art approach to demand response by using the Internet to directly provide participating commercial and industrial ("C&I") retail consumers with current, minute-by-minute, AECC load data. This data allows participating C&I consumers to better choose how to operate their businesses during peak summer periods.

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1 Arkansas Valley Electric Cooperative Corporation; Ashley-Chicot Electric Cooperative, Incorporated; C&L Electric Cooperative Corporation; Carroll Electric Cooperative Corporation; Clay County Electric Cooperative Corporation; Craighead Electric Cooperative Corporation; Farmers Electric Cooperative Corporation; First Electric Cooperative Corporation; Mississippi County Electric Cooperative, Inc.; North Arkansas Electric Cooperative, Incorporated; Ouachita Electric Cooperative Corporation; Ozarks Electric Cooperative Corporation; Petit Jean Electric Cooperative Corporation; Rich Mountain Electric Cooperative, Incorporated; South Central Arkansas Electric Cooperative, Incorporated; Southwest Arkansas Electric Cooperative Corporation; and Woodruff Electric Cooperative Corporation

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To encourage demand response, the Electric Cooperatives have maintained rates and charges that closely adhere to their cost of service. These rates and charges provide the economic incentives for retail consumers to voluntarily participate in demand response.

Perhaps the SPP Report best summarized the Electric Cooperatives' approach when it stated: "The very high penetration levels of demand response in Arkansas cooperatives can be traced to three factors: (i) long-term stability in the type of price signals sent; and (ii) sufficient bill savings potential to gain active customer participation and interest; and (iii) avoiding over-payment of incentives, so there is sufficient savings for participants, non-participants, and utility management."

A complete report is attached.
Exhibit One
Certificate of Excellence

Bret Curry

is awarded to Bret Curry who has successfully completed a comprehensive evaluation and is certified as a Building Analyst Professional as of August 31, 2010. Expires: 08.31.2013

Larry Zanker
Chief Executive Officer

Matthew Anderson
Manager of Certifications

BUILDING PERFORMANCE INSTITUTE, INC.
CERTIFIED

Level I – Residential Energy Audit Thermographer

THIS IS TO CERTIFY THAT

Bret Curry

HAS SUCCESSFULLY COMPLETED
THE FOLLOWING REQUIREMENTS FOR CERTIFICATION:
ATTENDING OUR TRAINING COURSE,
PASSING THE REQUIRED EXAMS, AND
SUBMITTING A FIELD ASSIGNMENT.

Certified Instrutor

CERTIFICATION NO. 18099
EXPIRATION DATE. FEBRUARY 10, 2015

Infrared Training Center – United States
25 Esquire Rd., North Billerica, MA 01862
AN ISO 9001 REGISTERED COMPANY
Bret Curry has successfully completed the following requirements for certification:

- Attending our training course,
- Passing the required exams,
- And submitting a field assignment.

Certification No. 18059
Expiration Date: December 13, 2017
Exhibit Two
Energy Efficiency

101 Ways to Save Energy
Your Touchstone Energy Cooperative has compiled this list of low-cost/no-cost energy-saving measures to help you better manage your home’s energy costs.

Energy Savings Home Tour
There are many things you can do in your home to make it more energy efficient. Take the Touchstone Energy Home tour to find ways to save energy. After you’re done with the tour, you can download a copy of Touchstone Energy’s popular Home Energy Savings Guide for more energy efficiency tips and resources.

Light Bulb Energy Saver
Switching from regular incandescent light bulbs to compact fluorescents can help make your home more energy efficient and help save you money. Find out how much you can save by using the Touchstone Energy Light Bulb calculator.

Water Heaters Saver
Learn which is the best type of water heater to have, and why.

Home Energy Saver Audit
This robust online audit will help you identify the best ways to manage and save energy in your home. The resource quickly calculates home energy use based on a detailed description of your home, its appliances and geographic location.

Home Energy Savings Guide
You have the power to control your energy costs. This Home Energy Savings Guide is a starting point to get you on the way toward better energy management for your home. In this booklet you’ll find valuable tips designed to create greater home comfort and improve performance. Learn how to save energy in all areas of your home. There is a list of additional resources located at the end of this booklet.

Seal the Deal
One of the best and easiest ways for consumers to save on their energy bills.
istomakesurethattheirhomeisproperlysealed.Hidden cracks and improper insulation in your home can amount to as much heat loss as having a window open all year round. That is why Touchstone has teamed up with ENERGY STAR® to bring you “Seal the Deal.” Seal the Deal is a short do-it-yourself video that shows what you can do to seal those small cracks and insulate your house to reduce your energy bill.

Simple Tips
Stopping energy leaks is a lot easier than you think. It doesn’t require a lot of time or a lot of money. Here are a few tips from your local electric cooperatives...the energy experts.

Commercial Energy Savings Guide
This guide educates business consumers on ways to implement energy efficient practices.

about an hour ago New industry for Clinton will create 224

Touchstone Energy Tools

TouchstoneEnergySaveTools

Seal the Deal

Commercial Energy Savings Guide

Simple Tips

about an hour ago New industry for Clinton will create 224
101 Low-Cost / No-Cost Home Energy-Saving Measures
Your Touchstone Energy Cooperative has compiled this list of low-cost/no-cost energy-saving measures to help you better manage your home’s energy costs.

Thanks for being our member.

For more helpful energy-saving hints, visit www.tsesavers.coop
Water Heating

1. Set water heater temperature no higher than 120°F.

2. For households with 1 or 2 members, a 115°F setting may work fine.

3. Install water-heater wrap per manufacturer’s instructions.

4. Drain 1–2 gallons from bottom of water heater each year to reduce sediment build-up.

5. Install heat traps on hot and cold water lines when it’s time to replace your water heater.

6. Insulate exposed hot water lines.

7. Limit shower length to 5–7 minutes.

8. Install low-flow shower heads.


10. Don’t let water run while you are shaving.

11. Don’t let water run while brushing your teeth.
Laundry

12. Wash clothes in cold water. Use hot water only for very dirty loads.

13. Do only full laundry loads.

14. If you must do smaller loads, adjust the water level in the washing machine to match the load size, especially when using hot water.

15. Always use cold-water rinse.

16. Use bath towels at least twice before washing them.

17. Clean your dryer’s lint trap before each load.

18. Make sure that the outdoor dryer exhaust door closes when dryer is off.

19. Verify dryer vent hose is tightly connected to inside wall fitting.

20. Check that the dryer vent hose is tightly connected to dryer.

21. Make sure dryer vent hose is not kinked or clogged.

22. Minimize clothes drying time; use moisture sensor on dryer if available.

23. Dry consecutive loads to harvest heat remaining in dryer from last load.

24. Consider using a "solar-powered" clothes dryer, an old-fashioned clothes line.
Kitchen

25. Use your refrigerator’s anti-sweat feature only if necessary.

26. Switch your refrigerator’s power-saver to “ON,” if available.

27. Clean refrigerator coils annually.

28. Set the refrigerator temperature to 34°–37°F and freezer temperature to 0°–5°F.

29. Ensure gaskets around door seal tightly.

30. Unplug unused refrigerators or freezers.

31. Use microwave for cooking when possible.

32. When cooking on the range, use pot lids to help food cook faster.

33. If you are heating water, use hot tap water instead of cold.

34. Remember to use the kitchen exhaust fan when cooking and turn it off after cooking.

35. Let hot food cool before storing it in the refrigerator.

36. Rinse dirty dishes with cold water before putting them into the dishwasher.

37. Use cold water for garbage disposal.

38. Only run dishwasher when fully loaded.

39. Use air-dry cycle instead of heat-dry cycle to dry dishes.


40. Replace any light bulb that burns more than one hour per day with its equivalent compact fluorescent bulb.

41. Turn off unnecessary lighting.

42. Replace outdoor lighting with its outdoor-rated equivalent compact fluorescent bulb.

43. Use fixtures with electronic ballasts and T-8, 32-Watt fluorescent lamps.

44. Use outdoor security lights with a photocell and/or a motion sensor.
Miscellaneous

45. Turn computers and monitors off when not in use.

46. Make sure electric blankets are turned off in the morning.

47. Turn waterbed heater off when not needed.

48. Turn large-screen TV’s off completely when not in use.

49. Turn off stereos and radios when not in use.

50. Remember to turn off hair curling irons and hot rollers.

51. Turn off coffee makers when not in use.

52. Turn off pool pump and/or heater when not needed.

53. Verify livestock water tank heaters are off when not needed.

54. Make sure heat tape is off when not needed.

55. Unplug battery chargers when not needed.

56. Ensure all new appliances you purchase are Energy Star-approved.
Heating & Air Conditioning

57. Set thermostats to 78°F in summer, 68°F in winter.

58. Run ceiling paddle fans on medium, blowing down in summer.

59. Run ceiling paddle fans on low, blowing up in winter.

60. Change HVAC filters monthly.

61. When installing new air filters, make sure they are facing in the correct direction. (Look for arrow on side of filter.)

62. When heating or cooling, keep windows locked.

63. Insulate electric wall plugs and wall switches with foam pads.

64. Caulk along baseboards with a clear sealant.

65. Close fireplace dampers when not burning a fire.

66. Caulk around plumbing penetrations that come through walls beneath bathroom and kitchen sinks.

67. Caulk electrical wire penetrations at the top of the interior walls.
68. Close shades and drapes at night to keep heat in during the winter.

69. Make sure drapes and shades are open to catch free solar heat in the winter.

70. Close shades and drapes during the day to help keep heat out during summer.

71. Ensure attic access door closes tightly.

72. Insulate attic access door.

73. Make sure insulation in your attic does not block soffit vents.

74. Do not close off unused rooms that are conditioned by forced-air systems.

75. Do not close supply air registers.

76. Ensure return air grilles are not blocked by furniture or bookcases.

77. Ensure windows and doors are properly weather-stripped.

78. Make sure outside soffit vents are not blocked.

79. Do not use roof-top power ventilators for attic exhaust as they may evacuate conditioned air from your home.

80. Have your HVAC system serviced once per year by a NATE-certified technician.
81. Monitor your home’s relative humidity in the summer. If it consistently stays in the 60-percent range or higher, ask your HVAC technician about lowering your central air conditioning unit’s indoor fan speed.

82. Ensure window A/C units are weather-stripped.

83. Ensure windows with window mounted A/C units have weather-stripping between the middle of the top and bottom pane.

84. Remove and clean window A/C filter monthly.

85. Keep “fresh-air” vents on window A/C units closed.

86. Minimize use of electric space heaters.

87. When using the fireplace, reduce heat loss by opening damper in the bottom of the firebox (if provided) or open the nearest window slightly.

88. Caulk around basement windows.

89. In a basement, seal the sill and band joist with durable caulking or foam sealant.

90. Ensure floor registers are not blocked with rugs, drapes or furniture.

91. Ensure your outdoor heat pump / air conditioning unit is kept clean and free of debris.

92. Outside your home, caulk around all penetrations including telephone, electrical, cable, gas, water spigots, dryer vents, etc.

93. Caulk around storm windows.

94. Use heavy-duty, clear sheets of plastic on the inside of windows to reduce the amount of cold air entering your home.
95. Verify your supply air duct “boots” (behind supply air registers) are caulked to your ceiling or wall sheetrock or flooring.

96. If in unconditioned space, verify your ducts are tightly connected to your HVAC equipment.

97. Verify all outdoor doors (including storm doors) close and seal tightly.

98. In two-story homes serviced by one HVAC system, a paddle fan at the top of the stairs can push down hot, second-floor air.

99. Install 15 minute, spring-wound timers on bathroom ventilator fans.

100. Always run your HVAC system fan on “AUTO.” Running it on “ON” uses more electricity and can decrease your air conditioner’s ability to remove moisture.

101. Keep your garage door down. A warmer garage in the winter and cooler garage in the summer will save energy.
Visit www.tsesavers.coop for more money-saving tips.
WHAT CAN YOU DO?

Take it one step at a time.
Choose an energy savings practice to see how the little changes add up.

GRAB THE INSULATION BLOWER TO HELP WEATHER THE ECONOMY.

SEE WHAT YOUR ENERGY BILLS LOOK LIKE WHEN YOU FLIP A FEW SWITCHES.

CLICK HERE for energy saving tips for manufactured homes.

TIP OF THE DAY

Ensure your outdoor heat pump/air conditioning unit is kept clean and free of debris.

Click here to learn more about the TogetherWeSave.com Tip of the Day Smartphone App.

http://www.togetherwesave.com/
Your Touchstone Energy® Cooperative

The power of human connections®

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Home > Energy Saving Tools > CFL Savings Calculator

CFL Savings Calculator

It's a fact. Compact Fluorescent Lamps (CFLs) are energy efficient light bulbs that use less power than incandescent bulbs. They save so much energy that they pay for themselves in about six months, saving you $40 over the life of just one bulb.

But why stop at one? See how much you can save with our CFL Savings Calculator. Just plug in the number of bulbs you plan to switch and watch the savings light up.

Compact Fluorescent light bulbs (CFLs) consume 66% less energy than comparable incandescent bulbs, yet last up to 10 times longer.

Which CFL Should I Use?

Different types of CFLs are made for different uses. When replacing your regular light bulbs with more energy efficient ones, use the Energy Star Light Guide to find the best fit and sample different color temperatures.

CFL Disposal

Because they contain very small amounts of mercury, CFL bulbs need to be disposed of properly. Many communities and home improvement stores have CFL recycling programs. Other communities accept used or broken CFLs in the trash when contained in two plastic bags.

To find your local CFL disposal and recycling options, visit the EPA CFL Disposal web page.

What can you do?
Energy Saving Tips

Unplug it. Learn electronic tips to save energy.

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Your Touchstone Energy® Cooperative

Ed the Energy Saving Expert

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Energy Myths

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How 2 Videos

Energy Efficient House

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Home > Energy Resources > How-To Videos
Seal the Deal

One of the best and easiest ways to save on your energy bill is to make sure your home is properly sealed. Hidden cracks and improper insulation can amount to as much heat loss as having a window open year round.

That’s why your local Touchstone Energy Cooperative teamed up with ENERGY STAR® for this simple how-to video, showing you how to seal those small cracks, insulate your home and reduce your energy bill.

Air Sealing Your Duct Work

Check Your Refrigerator’s Seals

Dishwasher Tips

In the Laundry Room

Saving Energy with Landscaping

Lower the Blinds, Raise the Savings

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Unplug it. Learn electronic tips to save energy.

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Commercial Energy Saving Tips

This guide provides basic hints on ways to reduce energy costs for business customers. All Touchstone Energy cooperatives strive to provide the best possible service and to help member owners save money through the efficient use of energy. Please contact your local Touchstone Energy cooperative for more information.

Tip 1: Check Your Rate

- Even if you were on the correct rate last year, things can and do change.
- If your operating hours change, or you add equipment or other load, your electric usage profile will change. A different rate could save money.
- Your electric provider may have added rates that are more suitable for your usage profile and could save your business money.
- Review your operation's usage pattern. A change in when you operate can result in savings on your utility bill.

Tip 2: Maintain Your HVAC Systems

HVAC equipment that is properly maintained will use less energy and enjoy a longer life. The greatest cost associated with an unscheduled HVAC breakdown may be in lost production - NOT in the repair cost.

- Keep indoor/outdoor coils and filters clean.
- Ensure that your HVAC system circulates the correct airflow.
- Lubricate. Check electrical connections and pulleys.
- Maintain correct refrigerant charge.
- Minimize duct leakage.
- Provide adequate ventilation in compliance with local applicable standards.
- Minimize HVAC runtime while facility is closed.
  - Protect temperature-sensitive materials.
  - Manage recovery if your facility is on a
Insulation terms

- U value: A value that expresses the number of BTU that will conduct through a combination of building materials sandwiched together per hour, per square foot, per degree of difference from side to side.

- R Value: A measure of the capacity of a material to resist heat transfer; the reciprocal of U value.

- 1/U = R, 1/R = U

- You cannot add R values.

- You cannot add U values; you can however convert U values to R values, add them and then convert the total R value back to a U value.

- Once R values approach 20, payback on additional insulation slows significantly.

Electrical Terms

- **Volts** - A unit of electric force equal to that amount of electromotive force that will cause a steady current of one ampere to flow through a resistance of one ohm.

- **Ampere** - A unit of measure for an electrical current, the amount of current that flows in a circuit at an electromotive force of one volt and at a resistance of one ohm.

- **VA** - Volts x Amps

- **KVA** - (Volts x Amps) / 1000

- **Watts** - Volts x Amps x Power Factor (Single Phase)

- **Watts** - Volts x Amps x Power Factor x 1.73 (Three Phase)

- **Power Factor** - The ratio of actual power being used in a circuit expressed in watts or kilowatts, to the power that is apparently being drawn from a power source, expressed in volt-amperes or kilovolt-amperes.

  - Electric resistance lamp: 117.5 volts x 0.31 amps = 36 VA, 36 watts (36 watts / 36 VA = 100% Power Factor)

  - Electric compact fluorescent lamp: 117.8 volts x 0.16 amps = 19 VA, 12 watts (12 watts / 19 VA = 63% Power Factor)

- **KWH** - A unit of measure of electricity supply or consumption of 1000 Watts over the period of one hour or 100 watts over 10 hours, equivalent to 3413 BTUs.

- **KW** - A standard unit of electrical power, equal to one thousand watts, a unit of demand.
Tip 3: Ventilate Properly

- Meet OSHA standards for occupancy numbers.
- Kitchens should run at a slightly negative pressure.
- Bathroom ventilators should be off when building is closed – if permissible with local codes.
- Ensure make-up air is drawn from an appropriate location. (For example, don’t pull from a dumpster area.)
- Ensure that kitchens have adequate air circulation.
- Do not over-ventilate. It is a waste of energy.

Tip 4: Water Heating

- Locate water heaters for most efficient delivery.
- Insulate water heaters.
- Ensure that the heating temperature is correct based on local requirements.
- Control water heaters based on actual periods of need during the day.
- Explore opportunities for heat recovery.
- Be familiar with your state’s Board of Health requirements before making any changes that could affect hot water delivery temperatures. For example:
  - There are strict requirements for MINIMUM and MAXIMUM water temperatures for nursing homes.
  - There are strict requirements for MINIMUM water temperatures for manual and automated dishwashing in retail food establishments.

Tip 5: Refrigeration

- Clean refrigeration coils regularly.
- Doors and seals on walk-in units should be kept in good repair.
- Make sure that refrigeration units are properly charged with refrigerant.
- Ensure units are properly defrosting. Check for ice buildup.

Clocking an Electric Meter

This is a useful tool to allow you to check your usage at different times of the day without any specialized equipment.

\[ \text{KW} = \frac{3.6 \times \text{KWh} \times \text{Meter Multiplier} \times \text{Revolutions}}{\text{Seconds}} \]

Meter Multiplier is shown on meter or available from utility. Many meters show KH. Use electronic meters; count the LED movements across the screen.
Tip 6: Indoor Lighting

- Depending on your electric rate and hours of operation, switching from magnetically ballasted T-12 fluorescent lamps to electronically ballasted T-8 lamps may save. (T-12 = 1.5" in diameter, T-8 = 1" in diameter)
- Consider switching from incandescent to compact fluorescent in canisters.
- Consider LED exit lighting instead of incandescent.
- Assess lighting levels after closing and explore opportunities to reduce lighting levels in other areas of your business. It may be more than you need.
- Group re-lamping may save on labor costs when compared to spot re-lamping.
- Explore opportunities to switch to high-pressure sodium or metal halide lighting in warehouses.

Tip 7: Outdoor Lighting

- Make sure lighting is adequate for safety.
- Make sure lighting timers are set only for hours needed.
- Consider using sun trackers or photocells in conjunction with electronic timers on outdoor lighting.
- Evaluate converting incandescent or mercury vapor lighting to high-pressure sodium or metal halide lighting.
- Ensure adequate turn-in lighting off of the highway.

The best source of outdoor lighting design, installation and maintenance may be your electric cooperative.

Basic Lighting Terms

- Man-made devices that produce light are called LAMPS.
- The amount of light emitted by a lamp is measured in LUMENS.
- When one lumen of light falls uniformly on 1 square foot of surface, the surface is illuminated to a level of 1 FOOTCANDLE.
- A complete lighting unit including lamp, fixture and electric component is called a LUMINAIRE.
- A lamp's ability to bring out the true colors of what it is lighting is called its COLOR RENDERING INDEX (CRI).
  - A scale of 0 to 100 is used.
  - The higher the CRI, the more color it will show.
Tip 8: Motors
(operating hours over 2,000/year)

- Manage motors with long run times to save energy cost.
- Replace motors under 25 hp with energy efficient motors vs. rewinding them.
- Depending on the run time, buying a new energy efficient motor can pay for itself in energy savings and may last longer than the rewound motor.
- Size loads properly for the job. Oversized motors will use more energy than properly sized motors.

Tip 9: Due Diligence is Essential

All that glitters is not gold, and everything a salesperson tells you will not necessarily save you money. Asking a few good questions can save you the grief of causing more problems than you cure with new technologies.

Questions to ask a product vendor or supplier:
- Is it UL approved?
- Do you have a letter from the manufacturer stating no equipment warranties will be voided?
- Do you have reports from credible sources (ASHRAE, IES, DOE, Lawrence Berkeley National Labs) supporting the product's effectiveness?
- Can you provide the names of 10 companies, with contacts and phone numbers, who have used your product for a year or more and who will attest to its effectiveness?
- How long has your company been selling this product?

Fuel Unit BTU Values

- Electric KWH = 3,413 BTU
- Natural Gas THERM = 100,000 BTU
- Natural Gas CCF = 103,000 BTU
- Propane GALLON = 91,600 BTU
- #2 Fuel Oil GALLON = 140,000 BTU
- MMBTU = 1,000,000 BTU
- One ton of refrigeration = 12,000 BTUs

Comparing cost effectiveness of different fuels

Cost per delivered = 1000 X Fuel Unit Cost

Fuel Unit BTU value = Fuel Unit BTU value

COP = Coefficient of Performance

COPs for Different Systems:
- Heat Pump - Use published COP
- Strip Heat - Use COP of 1
- Fossil Fired Furnace or Fossil Fired Boiler - Use published Steady-state Efficiency
Energy Efficiency

Building Guidelines for Energy Efficiency

This booklet was written to provide energy efficiency guidelines and measures for builders, sub-contractors and homeowners. Proper installation of these components into a new or existing home will provide energy savings, improve comfort and lower utility bills. When building a new home, it is far more cost effective to incorporate energy efficiency measures during construction than to add them in the future.

At the time of this revision, the components and measures within the downloadable booklet meet commonly accepted home energy science building practices supported by numerous industry experts.

Click here to download Building Guidelines for Energy Efficiency as a PDF.
New Industry for Clinton will create 224
Building Guidelines for Energy Efficiency

Electric Cooperatives of Arkansas
We Are Arkansas
www.SmartEnergyTips.org
Properly Installed Energy Efficiency
Building Components and Measures are the Keys to Saving Energy Costs for Your Home.

Summer heat gain from improperly installed wall and ceiling insulation. Top plate not caulked and sealed.

Summer heat gain from improperly installed folding attic staircase within conditioned air space.

Winter heat loss from improperly installed insulation around electrical outlet.

Winter heat loss from missing insulation around door. Poor door sweep.

The Electric Cooperatives of Arkansas infer no warranty, expressed or implied, with respect to the accuracy or completeness of the information contained herein. We do not assume any liability regarding the use of, or damages resulting from application of any information or process disclosed in this booklet.
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INTRODUCTION

This booklet was written to provide energy efficiency guidelines and measures for builders, sub-contractors and homeowners. Proper installation of these components into a new or existing home will provide energy savings, improve comfort and lower utility bills. When building a new home, it is far more cost effective to incorporate energy efficiency measures during construction than to add them in the future.

At the time of this revision, the components and measures within this booklet meet commonly accepted home energy science building practices supported by numerous industry experts.

The techniques described in the following pages are intended to work in conjunction with requirements and regulations as described by local building ordinances and codes. However, if any discrepancies should arise, seek direction and clarification from local building professionals, inspectors and code enforcement officials.

Contact your local electric cooperative energy adviser for additional energy efficiency resources or visit www.aecc.com.
SITE SELECTION

Careful consideration should be given to the building site when designing a new home. The site may contain natural layout and shading advantages. Ideally, a house should face north or south.

If the site's natural frontage runs north to south, creative planning and design can be used to take advantage of the sun and wind patterns.

A source of solar heating from windows can be obtained by locating major living spaces along the south side of the home. However, a minimum two-foot overhang should be used to protect against solar heat gain during summer months. Give careful consideration when making decisions about incorporating solar heat gain into your dwelling. Although the free heat from the sun is welcome on a cold winter day, unwanted and unmanaged summer solar heat gain can make your home uncomfortable and increase utility costs.

If the site requires the home to face east or west, deciduous trees should be located on the east and west sides to protect the home against summer sun. To attain higher efficiency in the winter, use less glass and door area on the north side of the house. Evergreens and shrubs will provide an excellent windbreak that may help reduce energy use during the winter months.
Energy efficiency design concepts should be considered when developing plans for a new home. Some of the more efficient designs maximize floor space while minimizing overall volume and exterior walls. A simple shape will reduce heat gain, heat loss and overall construction costs. Each additional corner and customized ceiling (cathedral, coffered and vaulted) will add to the cost of construction and increase the required BTUs (British Thermal Units) for heating and cooling.

These charts illustrate the additional square feet of sidewall space required when different shapes are designed with the same amount of floor space.

Plan A has 170 linear feet of outside wall and 1,360 square feet of outside wall space.*
Plan B has 180 linear feet of outside wall and 1,440 square feet of outside wall space.*
Plan C has an additional 240 square feet of outside wall space compared to Plan A.
Additional heating and cooling capacity would be required to condition Plan C.*

*Based on 8-foot ceilings.
Construction Standards

When framing exterior walls, the standards shown below are recommended. Past construction methods gave little or no consideration to corner or partition wall insulation. This uninsulated condition may promote the development of moisture within the wall cavity. Also, the uninsulated area does not provide a thermal barrier and promotes heat loss and heat gain. Moisture development occurs when a combination of heat loss, and/or heat gain, and the relative humidity reach certain levels. By its very nature, Arkansas' moist climate is prone to develop moisture within improperly or non-insulated components or dwellings.

Energy efficiency construction practices enable contractors to insulate these crucial points, use less framing materials and simplify the framing process.

Corner and Tee Construction for Energy Efficiency

Corners and tees are components that can affect the overall insulating performance of an exterior wall. The framing illustration shown is recommended to maximize insulation materials at corners and tees.

Exterior Walls

Either 2 x 6 or 2 x 4 framing can be used in energy efficiency home construction. Your choice of framing materials may affect insulation options and may restrict the ultimate R-value of the wall. A minimum R-13 is recommended.

Cellulose or foam insulation are preferred, and are important components of the ultimate R-value you wish to achieve.

Other elements which can impact the desired R-value are interior finish materials, vapor barriers, exterior sheathing products, and siding.

Headers

Headers for doors and windows located on outside walls should include Styrofoam or other rigid insulation between the two plates. All edges and corners should be caulked and sealed.

Electric Cooperatives of Arkansas

Building Guidelines for Energy Efficiency
Energy is a measurable quantity of heat, work or light. Two laws of thermodynamics science govern the behavior of heat on planet Earth. First, heat energy merely moves from place to place and changes form. Secondly, heat moves from high temperature regions to low temperature regions — never in reverse. So, the purpose of insulation is to slow or impede the transfer of heat from warmer areas to colder areas. During a hot summer day, heat is moving through building materials, windows, doors and air voids as it makes its way into an air-conditioned dwelling. The opposite happens on a cold winter day.

Properly installed insulation will pay for itself by reducing heating and cooling costs. Additional benefits of insulation are a significant reduction of air infiltration, noise reduction, improved comfort and energy conservation.

The three most common forms of insulation used in residential construction are fiberglass, foam and cellulose. At the time of this revision, the Electric Cooperatives of Arkansas recommend the use of properly installed cellulose and foam insulations. New analysis technologies, testing equipment and thermal imaging cameras are enabling certified energy auditors and infrared thermographers to objectively study insulation performance. Numerous studies, opinions and white papers are available that conclude properly installed cellulose and foam insulations outperform fiberglass insulation.

Cellulose and foam insulation not only act as excellent insulating materials, they also perform as air infiltration barriers by adequately sealing cracks and penetrations.

The term “damp-blown” cellulose insulation referenced in this publication is a process application. Regular cellulose insulation is fed through an installation machine upon which a small amount of adhesive and water are added to assure a properly dense-packed installation. Properly installed cellulose insulation dries in a few hours and will not settle over time within the wall cavity.
The industry standard for comparing insulating materials is by the thermal resistance called R-values. R-value refers to a material’s resistance to heat flow, not thickness. Note the recommended levels of insulation for Arkansas in this chart published by ENERGY STAR®. The higher the insulation’s R-value, the greater the insulating property. Check your local building codes for fire ratings.
Infrared thermal imaging is an indispensable tool in the "home science" field. Thermograms display heat energy as visual images and confirm areas of heat gain or heat loss. Thermograms like the ones shown reveal common problems found in many homes across America. The construction components within this booklet are designed to impede and slow the transfer of heat in residential dwellings.

### Image and Object Parameters

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**Description**

Temperatures in excess of 112 degrees were recorded inside the dwelling at joints and areas of improperly installed fiberglass insulation. Some areas were noted reaching 120 degrees.

An infrared camera detects heat nearing 130 degrees. The heat is moving from a hot rooftop through improperly installed fiberglass insulation into an air-conditioned dwelling.

Furred-down ceiling below a shed-style roof. Double layered 6" (improperly installed) fiberglass batts. Temperature recorded on shed roof over 160 degrees. Roof is south-west facing. Room temperature is hot, uncomfortable and has high humidity level.
Ceilings

Ceiling insulation should meet the R-38 minimum requirements. Blown cellulose is recommended and should be approximately 12-14 inches in depth to equal R-38. Many builders in Arkansas are now increasing ceiling insulation to an R-45 level. Make sure to incorporate proper attic ventilation.

Cathedral Ceilings

Conventional construction required cathedral ceilings to have insulation, a vapor barrier and adequate ventilation similar to the illustration. This type of construction enabled convective ventilation to prevent potential moisture development from heat loss during the winter or heat gain during the summer. One must incorporate this method if using fiberglass insulation. As mentioned previously, the Electric Cooperatives of Arkansas do not recommend the use of fiberglass insulation in a retrofit or new home construction … especially on cathedral ceilings.

Home building experts now treat cathedral ceilings like a diagonal wall. Think of an “A-framed” house. It’s nothing other than two walls inverted and used as a roof. Constructed properly, the need for vapor barriers and ventilation is no longer necessary. And thanks to damp-blown cellulose and foam insulation products, the ceiling cavity can be completely filled and eliminate the factors that cause the development of moisture. The “complete-fill” or “cathedralized” insulation method for cathedral ceilings must be installed properly or moisture issues might develop.

For exterior walls of conditioned air spaces, insulate to an R-value of 13 or greater. An R-13 value can be obtained with standard 2 x 4 framing construction and proper installation of damp-blown cellulose or foam insulation. Properly installed cellulose or foam may actually increase the minimum R-13 thermal value while dramatically reducing air infiltration.
Floors

Floors over vented crawl spaces or unconditioned basements should be insulated. A minimum R-value of 19 is recommended. A common misconception is that heat rises. *Warm air rises,* heat travels in all directions, continually seeking cooler areas. Uninsulated floors become a point of least resistance for heat to travel.

One of the easiest methods for insulating floors over crawl spaces is the application of expanding foam insulation. The product is sprayed against the underside of the floor, joist cavity and stem walls.

Crawl Spaces and Perimeter Walls

Crawl space perimeter walls can be insulated with one to two inches of rigid foam board properly applied to the interior side of the block with adhesive, or with one to two inches of damp spray cellulose. The insulation should not come closer than three inches to the ground for termite inspection purposes. However, at the time of this revision, termite companies are reviewing the continuation of this practice since concrete block, treated bottom plate lumber, properly manufactured cellulose insulation and foam insulation are not considered food sources for termites. Contact your termite company for clarification.

A vapor barrier should also be installed over 100 percent of the ground area. In other words, there should not be any exposed ground within the crawl space. A seamless 6-mil or thicker polyethylene cover is recommended.

Concrete Slab Floors

Concrete slab floors should have a minimum one-inch thick waterproof insulation board between the entire outside edge of the slab and foundation. This should extend vertically at least four inches and 24 inches horizontally under the slab. Basement floors less than two feet below ground level should also be insulated in this manner.
Building Guidelines for Energy Efficiency

Basement Walls

If a basement area is to be used as a living or work area, the interior walls should be framed and insulated to meet a minimum R-value of 13.

Damp blown cellulose or foam insulation should be installed between the studs in a basement wall with the type of finish illustrated. The framing lumber will determine the amount of insulation that may be installed. Unexposed walls, as well as exposed walls, need to be insulated.

Note: Be sure to insulate the area where the floor joist and sill header meet.

Rigid foam board insulation is commonly used in work and unfinished areas. It may be glued to the walls or attached to wood studs or furring strips. The extruded polystyrene is preferred over the molded beads type of polystyrene insulation.
**Windows**

Windows are used for many reasons – to allow sunlight and warmth to enter the home, introduce fresh air, view the outdoors, to add beauty and style to the home and more. However, the reality is windows generally have low R-values and can be a home’s largest source of significant energy loss. In an energy-efficient home, the glass should be kept to 10 percent or less of the total wall area and should never exceed 20 percent.

**Windows should be selected according to the following properties, listed from best to worst.**

**Frame**
1. Wood or vinyl
2. Metal with a thermal break in frame.
3. Metal without thermal break in frame. *(These are energy wasters.)*

**Glazing**
1. Triple pane with Low-E glass.
2. Triple pane.
3. Double pane with Low-E glass. *(Usually the best value.)*
4. Double pane.

It can be difficult and confusing for homeowners to determine whether energy efficiency and quality features are present in a window. For this reason, we recommend that you look for the National Fenestration Rating Council (NFRC) rating label on the window. This label will enable you to compare the energy efficiency features of different window brands. Also, do not let a window brand name be your only determining factor. Without diagnostic equipment, one of the only ways for consumers to confirm the energy efficiency characteristics of a window is the NFRC label. Most all major brand name window manufactures make less efficient, low-cost windows. Compare NFRC labels to guarantee you are getting an efficient window. Furthermore, always ask to see the NFRC label. If the window does not have the NFRC label, or the salesman cannot provide one, there is a possibility that window may not be energy efficient.

When comparing NFRC labels, look for windows with Low-Emissivity (Low-E) and a U-factor of .35 or lower. Also look for windows with a Solar Heat Gain Coefficient (SHGC) of .30 or lower. The lower the U-factor and SHGC, the more efficient the window will be. Since Arkansas is located in a moist, warm climate, properly installed and sealed, Low-E, low U-factor and SHGC windows can make a significant reduction in heating and cooling costs. The Low-E reflects the sun’s radiant heat during hot summer months. Both Low-E glass and low U-factor windows help reduce heat gain through the glass during summer months and retain heat in the house during winter months. A low SHGC helps block heat generated from the sun.
Doors

All doors opening to the outside or into an unconditioned area, such as a garage, should be insulated. Insulated metal and fiberglass doors with urethane foam core are recommended. Storm doors can be added but only marginal gain will be realized, with the exception of wood doors. Care should be taken when storm doors are added to metal doors with a western exposure due to excessive solar heat build-up. If French doors are preferred, use those with one side fixed and with a high energy efficiency rating.

Cross Section of Energy-Efficient Door

AIR INFILTRATION

Air infiltration is unwanted and unmanaged air movement that adversely affects home comfort and drives up energy-related costs. Numerous studies by residential energy efficiency experts pinpoint air infiltration as the biggest source of energy waste in American homes today. No home is built airtight; however, the movement of air into and out of homes can be reduced, controlled and managed.

Air moves through any unsealed cracks or gaps associated with normal construction. These areas include cracks in framing, under base plates, top plates, around duct registers, through holes for electrical and plumbing services and especially around windows and doors.

Caulking can substantially reduce air infiltration. A high quality brand of silicone acrylic latex caulk is recommended. Properly installed house-wrap may also reduce infiltration. The material is applied on the outside of a framed wall between the wall and siding. It is also an excellent means of sealing around doors and windows. The wrap is not a vapor barrier.
Caulking, foam sealants and house-wraps are very good and relatively inexpensive ways to reduce your heating and cooling bills. They also help you get the most comfort for your energy dollars. Apply caulking from the inside of a framed dwelling prior to the installation of the insulation and sheetrock components.

It is recommended that all electrical, plumbing and outside penetrations into the home be caulked and sealed to prevent outside air infiltration. Since all homes are unique and different, the following is a general list of areas to focus upon. When in doubt, caulk it.

- **a. All penetrations** (wiring, plumbing, etc.) into all wall cavities should be caulked and sealed, including through the top and bottom plates of the wall cavity.
- **b. Windows and doors** should be caulked and sealed with low-expansion foam specifically designed for those applications.
- **c. Foam** should be used between the box sill and foundation or basement wall.
- **d. Bottom plate** should be caulked to the sub floor.
- **e. All headers** should be caulked and sealed into place.
- **f. House wrap** should be installed under siding.
- **g. Double top plates** and studs should be caulked.

**A blower door system is a diagnostic tool designed to measure the airtightness of buildings and to help locate unwanted air infiltration.**
Air can enter the home through infiltration, opening doors and windows, or from mechanical ventilation. Natural ventilation refers to the entry of air through intentional openings such as doors, windows and vents. Mechanical ventilation is the intentional removal of indoor air or introduction of outdoor air using a fan or blower.

As mentioned previously, it's virtually impossible to create an airtight home. However, some building codes may require mechanical ventilation if a blower-door test reveals .30 (30%) natural air changes per hour or lower. Visit www.ashrae.org for comprehensive details pertaining to ventilation and indoor air quality.

### Attic Ventilation

Ventilating attic space to allow warm, moist air to escape is important. With no vapor barrier, at least one square foot of vent opening for each 150 square feet of floor area is necessary. If your vent has 1/8" or 1/4" wire mesh over it, it should be 1 1/4 times as large as the basic size. If it is covered by 1/4" mesh and a louver, it should be twice as large for proper ventilation.

If you have a vapor barrier, there should still be one square foot of free vent opening for every 300 square feet of attic floor. One half of the vents should be located near the roof ridge, and one half of the vents located near the soffit. These vents should be located so that half of the vents are low and half are high.

**Inadequate ventilation and insulation or closing attic vents may cause:**

- Mildew and wood rot of roof joists
- Condensation in the attic that robs insulation of R-value
- Water stains on interior ceiling
- Frost during winter months

### Crawl Space Ventilation

At the time of this revision, there is developing research that indicates a tightly sealed crawl space is far more energy efficient than those with open ventilation. One theory suggests enabling cold outside air into the crawl space during the winter increases winter heating bills. Conversely, the hot air from summer increases cooling bills. In southern climates, allowing hot and cold air into the crawl space may introduce moisture into the home. Also, open crawl spaces may cause condensation on uninsulated ductwork and promote mold growth.
Crawl spaces cannot be tightly sealed if there is constant or recurring moisture from natural springs, water leaks, drainage, etc. Building codes may require ventilation, so always be sure to verify with local code enforcement before sealing the crawl space.

If a crawl space must or is required by local code to be ventilated, locate vents as high as possible from ground level and close to the bottom of the joists.

Crawl space vents are typically 16 inches by 8 inches and have a net-free area of 64 square inches. The vents should be spaced far enough apart to provide for effective cross-ventilation.

If a ground cover is provided, one square foot (144 square inches) of net-free vent area for each 1,500 square feet of crawl space is sufficient, but more vents are desirable. Four vents, two each on opposite sides of the house, provide minimum ventilation.

If no ground cover is provided, the vent area should be increased to one square foot (144 square inches) of net-free vent area for every 150 square feet of crawl space.

**Kitchen and Bath Ventilation**

All exhaust fans should be vented to the outside, not the attic, and should be equipped with a back draft damper. Humidity-sensing exhaust fans should be installed in all bathrooms and always vented to outside.

**Radiant Barrier**

Radiant barriers are materials installed in buildings to reduce summer heat gain and winter heat loss. They also reduce heating and cooling energy usage. The potential benefit of attic radiant barriers is primarily in reducing air-conditioning cooling loads in warm or hot climates.

Radiant barriers work by reducing the heat transfer from thermal radiation across the air space between the roof deck and the attic floor, where conventional insulation is usually placed. Radiant barrier roof decking works by reducing the amount of radiant heat on the attic insulation. Since the amount of radiation striking the top of the insulation is less than it would have been without a radiant barrier, the insulation surface temperature is lower and the heat flow through the insulation is reduced.

It’s not uncommon during an Arkansas summer for temperatures to reach near 160 degrees on the south facing side of an asphalt-shingled roof. Without radiant barrier roof decking, attic temperatures may approach temperatures near the actual external roof temperature. Installing radiant barrier roof decking can reduce the temperature in the attic up to 50 degrees. The reduction in heat gain is very important if ductwork is located in the attic.

**General Ventilation**

Vent all clothes dryers to the outside. Insulate long runs of ventilation ducts, especially through an attic, to reduce moisture condensation within the duct.
The human body is fairly comfortable with a minimum relative humidity of 20 percent and maximum of 50 percent. An average level of 35 percent to 50 percent is recommended for maximum comfort. Low levels of humidity can cause dry skin, aggravate respiratory ailments, dry out furniture and woodwork, and require higher heating temperatures to satisfy occupants of the house and to control static electricity.

High levels of humidity can impair insulation effectiveness, cause condensation at windows, and cause structural rotting of joists and framing.

As outside temperature drops, the humidity level in the home decreases. Also, a home with low air infiltration may have higher humidity levels.

**To increase humidity in your home:**
- Install a humidifier.
- Properly install glass doors and damper in fireplace.
- Install tight fitting storm sash around windows and doors.
- Properly install vapor barriers during construction.

**To decrease humidity in your home:**
- Install an electric air conditioner.
- Install a dehumidifier.
- Install adequate exhaust fans for kitchen, bath and laundry areas.
- Install humidity-sensing exhaust fans in bathrooms.
- Properly ventilate clothes dryer to outside.
- Increase mechanical ventilation.

**Homes with one or more of the following conditions are more likely to experience increased humidity levels:**
- Less than 800 square feet of living areas.
- Less than 250 square feet per occupant.
- Tight wall or ceiling construction, weather-stripping on windows and doors.
- Heating systems that use outside combustion air.
- Low-sloped roofs or unvented attics.
- Gas ranges, unvented gas stoves and gas logs, other gas-fired appliances.
- Crawl spaces with no ground cover.

**Vapor Barriers**

A vapor barrier is a material with high resistance to moisture flow. By definition, it should have a rating of 1.0 perms or less.

Using fiberglass insulation may cause excessive moisture in your home. Moisture can filter through insulation, causing it to become damp and matted. Wet insulation loses its effectiveness. A good vapor barrier installed on the inside of exterior walls will protect the insulation from moisture in your home.

Although a vapor barrier will protect insulation, it will also increase the humidity level in your home. With a properly installed vapor barrier, humidity control becomes essential. In most cases, a vapor barrier is not necessary or recommended when cellulose or foam insulation are properly installed in the walls.
Concrete Slab

Apply a 6-mil polyethylene plastic film to the ground area before the slab is poured. Lap material six inches and away from the direction of the concrete pour.

Crawl Spaces

If you are insulating the floor over an unheated crawl space, lay 6-mil polyethylene film on the ground to keep the moisture from moving into the house. Extend the plastic sheet several inches up the walls and fasten. Overlap and anchor adjoining pieces.

BLOWER DOOR TESTING

While following the recommendations in this guide will reduce the amount of air leakage or infiltration, some sources of leakage are extremely difficult to locate. Homes can be tested for leakage with a device called a blower door system. Blower door testing involves depressurizing the home to artificially increase the amount of leakage. Leakage can be readily identified and sealed. The blower door also provides an assessment of the home's overall tightness. A similar process using a duct-blaster is used to test for duct system leakage. Duct leakage has been identified as a serious problem in many areas of the country.
A major decision when building a new home is the type of heating and cooling system to install. Most contractors and homebuilders using electricity as their choice for heating and cooling are selecting heat pumps. Two types of heat pumps available on the market today are geothermal and air source.

**Geothermal Heat Pump**

The most economical heating and cooling system available today is the geothermal heat pump.

Ground source or geothermal heat pumps use the earth as a giant heat sink. By circulating a water and antifreeze solution through a series of high-density polyethylene pipes buried in the ground, the ground source system uses the earth's constant temperatures as a pre-heating and pre-cooling cycle. The compressor and mechanical equipment provide the balance of heating and cooling required. The result is a system that will deliver from three to five units of warm, comfortable heat for every unit of electricity consumed. The piping loop can be buried in the ground either horizontally or vertically.* Lake loops and well water systems are additional ways of installing a loop system.

Geothermal heat pumps can also provide free domestic hot water from a de-superheater feature while in the air conditioning mode. They can also be equipped to provide year-round hot water at a substantially reduced cost compared to a conventional water heater.

*Vertical Loop Ground System

Typical Vertical Installation
- one loop per ton
- each loop 10-15 feet apart and 150-200 feet in depth

*Horizontal Loop Ground System

Typical Horizontal Installation
- 500-600 feet of pipe per ton
- 200-300 feet of trench per ton

Vertical Loop Installation to 240' Depth

Horizontal Loop Installation
Air Source Heat Pump

The air source heat pump operates on the same principle as the geothermal heat pump except the air source heat pump extracts heat from the outside air. It provides comfortable and affordable heating and cooling all in one unit. Efficiencies are stated in terms of SEER, Seasonal Energy Efficiency Ratio; and HSPF, Heating Seasonal Performance Factor. Units with a SEER of 13 or greater and HSPF of 8.5 or greater are recommended.

Regardless of the type of heating and cooling system you install, it is critically important to have the unit properly sized for your particular home. Bigger is not better!

Your electric cooperative or a reputable heating, ventilation and air conditioning (HVAC) contractor can assist you in properly sizing your heating and cooling system.

For more information on a variety of heating and cooling systems, contact the member services department at your electric cooperative. Cooperative staff will be happy to provide you with additional information, brochures and a list of local, qualified dealers. They can also provide you with information on operating costs for your area.

Duct System

The duct system must be properly designed and sized to allow adequate and balanced airflow throughout the house and to maximize operating efficiency of the HVAC system.

It is recommended that the duct system not be placed in an unconditioned attic. Extreme fluctuations in temperature have a detrimental effect on the operating equipment. All ducts running through unconditioned areas must be insulated. Use radiant barrier roof decking if installing ductwork in an attic. If possible, the duct system should be located in the conditioned area as a furred-down design, or in a basement, crawl space or slab.

The entire duct system should be constructed of metal and be made airtight with duct mastic and reinforcing tape. Never use general-use duct tape to seal and tape joints. Also, avoid using flex-duct. The duct system should also be properly insulated. Special ductwork for slab installation is now available. Contact a reputable HVAC dealer for details.
Fireplaces generally are not energy efficient; however, many modern homes have them for aesthetics and nostalgia. If you plan to include a fireplace in your home, consider adding more energy efficiency components and measures that will offset the energy loss from the fireplace.

1. If possible, install the fireplace on an interior wall to minimize heat loss and heat gain.
2. Install an easily closed damper to seal off outside air.
3. Install an outside air vent or source for proper combustion.
4. Make sure you have airtight glass doors.
5. Install a fireplace insert to increase heating efficiency.

Fireplace Installation in an Energy-Efficient Dwelling
When purchasing an electric water heater, match the gallon size to the needs of your family. A 50-gallon water heater is normally adequate for an average family.

Consider installing a high energy-efficient Marathon water heater. All units have an energy factor rating of .91 to .95. They come with a lifetime warranty on the tank and are guaranteed to never leak or rust. Another option is the ultra-efficient General Electric GeoSpring Hybrid water heater. At the time of this revision, the GeoSpring was ENERGY STAR® rated with an Energy Factor (EF) of 2.35 or 235% efficiency. The GeoSpring uses heat pump technology and is considered one of the most efficient water heaters available. Contact your local electric cooperative for details about both water heaters.

Check the temperature on your water heater for additional savings. Most water heaters that are set for 120°F can provide adequate hot water for most families.

1. When possible, place your electric water heater on a two-inch thick rigid insulation board to insulate the bottom of the tank.
2. Insulate all hot water lines above and beneath your floor. Insulate hot water lines located in slab before concrete is poured.
3. Locate your water heater in a conditioned area of your house, preferably close to the center of the house.
4. Install heat traps for additional savings.

When shopping for water heaters, always look for the bright yellow energy rating tag. Look for units that have an EF rating of .90 (90% efficiency) or higher. Also, water heaters of .90 or higher generally do not require insulating blankets.

At the time of this revision, the U.S. Department of Energy has proposed higher efficiency standards for water heaters. Proposed increases, if finalized and promulgated, will not take effect until 2015. When building an energy-efficient home or replacing an existing water heater, always strive to install an electric unit with the highest EF possible.
Lighting requires planning when building a new home. Today's lifestyles and modern technology can make a big difference in the look and convenience of lighting in your home.

Lighting is part of your environment. It affects your mood, color, safety, convenience and decorative quality of your home.

Lighting can help you relax or can keep you awake. Proper planning allows you to control your home environment with lighting. Include in your lighting plan all the functional and decorative lighting you require so the wiring can be installed during construction.

Plan your switch locations properly to allow walking through the house from lighted area to lighted area without having to go back to turn off a light.

Make sure that you have plenty of outlets throughout your home, including your hall and foyer.

Plan your outdoor light controls in easily accessible locations.

Include all the areas where you may need additional lighting, such as the shower, closets, under kitchen cabinets, stairways, etc.

**Compact Fluorescent Lighting**

A much more energy-efficient lighting option is the compact fluorescent lamp (CFL). CFLs have a little higher initial cost, but use about 70 percent less electricity than incandescent bulbs and last up to 10 times longer. They provide the same quality of light as incandescent and give off less heat. Compact fluorescents use the same principle as standard tube fluorescents, but the tube is smaller and folded over to concentrate the light.

Because of their smaller size, compact fluorescents can be used in table and floor lamps, ceiling fixtures, ceiling fans and candelabras. Compact fluorescents come in three shapes: twin-tube, globe (or cylinder) or spiral. All types need ballasts to operate, devices that alter the electric current flowing through the tube. Many come with ballasts attached, while some require that ballasts be purchased. Dimmable CFLs are also readily available.

**Light Emitting Diode**

LED (Light Emitting Diode) bulbs can use 20 to 50 times less energy than incandescent bulbs and may last for up to 20 years. At the time of this revision, LED bulbs are available, but are quite expensive. Much like CFLs in their genesis, LED bulbs most likely will become more available and affordable as technological advancements improve and economics affect supply and demand. As your CFLs reach their useful life, replace them with LEDs. Buying them one at a time may fit your budget.

Where applicable, only use recessed light fixtures that are rated insulated contact airtight (ICAT) and can be insulated from above.
Insulated Contact Airtight Recessed Lighting

Make sure that recessed lights, which are most often located in attics or vaulted ceilings, are not a source of air infiltration. This causes energy loss and leads to moisture damage of ceiling insulation, reducing its effectiveness. Invest in ICAT recessed ceiling lighting fixtures.

Known as ICAT fixtures, these recessed ceiling lights feature aluminum housings that allow them to be completely covered with insulation. They also have gaskets to seal the space between the fixture and ceiling opening. These other features reduce air infiltration, making airtight recessed fixtures the most energy efficient choice for this type of lighting. Airtight recessed lighting fixtures also come in a wide range of styles that can accommodate a variety of lamp types, including CFLs and LEDs.

Outdoor Lighting

Outdoor lighting in the form of lamp posts, sidewalk lights, floodlights and accent lights can enhance the beauty of your home and expand your family’s opportunities for outdoor activities. More importantly, outdoor lighting provides extra safety and security.

For energy-efficient outdoor lighting, choose CFLs and LEDs designed for outdoor use.

When selecting lamp posts and accent lights, choose those that have a light-sensing control to provide efficient dusk-to-dawn illumination.

For security and safety, locate energy-efficient outdoor lights by all your entries, garage and driveway. Consider using solar-powered decorative lighting where applicable.
Recommended Reading and Helpful Websites:

Residential Energy by John Krigger and Chris Dorsi

www.energystar.gov  www.doe.gov

For more information, contact your local electric cooperative.

Electric Cooperatives of Arkansas
We Are Arkansas
www.SmartEnergyTips.org
Energy Efficiency

Reading Your Meter

An electric meter will typically have four or five dials on it. The four-dial meter is the most common. The reading for each dial is the last number passed by the pointer. In other words, when the pointer is positioned between two numbers, record the lower of the two numbers. For example, if the pointer is between five and six (regardless of which way the pointer turns), the reading is five. The dials are read and recorded from left to right. The consumption during any interval can be calculated by taking the difference between the previous reading and the current reading of the dials. If the previous reading was 5,236 kWh, the usage would be 610 kWh.

Example:
Previous Reading: 5,236 kWh

Usage during the period: 610 kWh

Note: On a four-dial meter, looking from left to right, the numbers on the first and third dial are in a counter-clockwise motion. The numbers on the second and fourth dial are arranged in a clockwise arrangement on the dial. The pointer on the second and fourth dial also moves in a clockwise fashion.

The five-dial meter works in the same way. On a five-dial meter, looking from left to right, the first, third and the fifth dial's numbers are in a clockwise arrangement on the dial. The pointer for the first, third and fifth dial also move clockwise. The second and fourth dials are arranged and move counter-clockwise.
Energy Efficiency

Energy Costs Adjustments

The Fuel Adder

Why is a fuel adder on my bill?

Perhaps explaining what a fuel adder is will help answer the question better. A fuel adder surcharge is implemented when the cost of producing electricity increases. Your electric cooperative must add the temporarily high surcharge to your bill to cover the additional costs of generating electricity.

Why are there additional costs with making the electricity?

Good question. The rising costs of fuel, primarily natural gas, that is used to generate electricity is the primary driver behind rising electricity costs.

Is there anything that can be done about the fuel adder charge by my local cooperative?

Unfortunately, no. As a not-for-profit organization, you can rest assured your local electric cooperative will never make a profit off of our members' added burden. By law, a fuel adder must go directly toward covering the added costs. Nothing more, nothing less.

Is this just a problem in Arkansas?

While our state often benefits from a low cost of living, energy prices are rising nationwide. For some natural gas and propane users, their energy bill will increase at a higher rate. For members like you, your electric cooperative has a proven record of managing costs to keep rates as low as possible. That commitment to you will never change.

What can I do to keep unnecessary costs from attaching to my monthly bill?

Contact your electric cooperative for energy-saving tips on keeping your electric costs down. It takes working together to make the best use of resources. As your friendly, local cooperative, we do everything in our power to provide safe, reliable electricity and service to you.

Energy-Saving Tip

Close all draperies and shades at night to reduce heat loss. Drapes save energy only if they fit tightly around the window frame. This usually means a valance at the top, side guides and a weighted hem.

Electricity in Arkansas

What does electricity come from?

There are a number of ways to produce electricity. The most common methods include using coal or natural gas at generation facilities to generate electricity.

Why does this matter to me?

When the costs of fuels increase - and they have skyrocketed recently - it can trigger a "fuel adder" charge on your bill to cover the extra costs incurred by your local electric cooperative to deliver power to you.

http://www.aecc.com/energy-efficiency/energy-costs-adjustment/
Energy Efficiency

Where Does My Money Go?

Annual Energy Bill for a typical Single Family Home is approximately $2,000.

Source: Residential Energy Consumption Survey, 2001

Average price of electricity is 10.6 cents per kilo-watt hour. Average price of natural gas is $12.42 per million Btu.

* "Other" represents an array of household products, including stoves, ovens, microwaves, and small appliances like coffee makers and dehumidifiers.
Energy Efficiency

Standby Power

Most experts agree that standby power or phantom loads are electricity used by appliances and equipment while they are switched off or not performing their primary function. That power is consumed by power supplies which are those black cubes sometimes called “vampires.”

They convert AC into DC. Standby power use is also caused by circuits that continue to be energized even when the device is “off.” Big-screen televisions are an example of a consumer electronic item that creates this unsuspected energy consequence.

Almost any product with an external power supply, remote control, continuous display (including an LED), or charges batteries will continuously draw power. Sometimes there is no obvious sign of continuous power consumption, and a meter is needed to be certain. The obvious are computers and other consumer electronic items left on at all times.

Nobody knows for sure exactly how much power is lost due to standby losses. Yet it has been determined that typically 5-10 percent* of residential electricity in most developed countries and a rising fraction in the developing countries, especially in the cities is lost. Standby power in commercial buildings is smaller, but still significant.

Reducing standby power in a home can be difficult, yet not impossible. Here are some suggestions:

- If an appliance or device is not used frequently, simply unplug it.
- Unplug battery-charging devices when not in use.
- Use switchable power strips for clusters of computer and television equipment. Zero consumption can be reached with the flick of a switch.
- Purchase ENERGY STAR® appliances. Most are significantly more energy efficient.
- Buy a low-cost watt-meter, measure the usability of devices and take action. This exercise can pay back the cost of the meter in savings. The Kill-a-Watt and Power Cost Monitor are two user-friendly versions.

Standby power is necessary for many functions in a home. Some include monitoring temperature and other conditions with refrigerators and freezers and maintaining signal reception for wireless network signals, telephones, displays, clocks and more. So eliminating standby power is next to impossible. Yet learning how to efficiently monitor standby power will help take control of energy consumption and your electric bill.

Click here for a complete list of ENERGY STAR® qualified products.

Click here to learn more about appliance energy consumption.

*Lawrence Berkley National Laboratory

Tips to help control energy consumption and costs.

Our commitment to providing environmentally sound power resources.

http://www.aecc.com/energy-efficiency/standby-power/
Energy Efficiency

Electric Cooperatives of Arkansas Team with Doug Rye to Build Energy-Efficient Homes

Building an energy-efficient home is easier than one might think. Doing so requires additional planning and effort on the front end before breaking ground. That’s where Doug Rye and the Electric Cooperatives of Arkansas can assist.

“Any home can be built in a more energy efficient manner,” said Doug Rye, a well-known energy efficiency expert who is a consultant for the Electric Cooperatives of Arkansas’ model home program. “If you are trying to educate people, why don’t you build a house that they can see, touch, and feel?”

So the Electric Cooperatives of Arkansas teamed up with Rye in 1997 to build a series of energy-efficient homes across Arkansas. The homes incorporate proven energy efficiency measures, components and appliances. Each home is guaranteed not to exceed a predicted amount in heating and cooling costs.

How does the program work? First, the builder, contractors and homeowner sign a contract agreeing to comply with installation and construction of required components and measures. They also agree to follow program guidelines. A hold harmless form is also required. Energy efficiency experts from a local electric cooperative and statewide organization supervise and monitor each component through the entire construction process. Photography and video are utilized to document construction and installation. The homeowner also agrees to allow the sponsoring electric cooperative to host a public open house for one weekend. Also, Doug Rye will host his weekly radio show “Home Remedies” from the home and field questions from visitors.

According to model home program coordinator Bret Curry, the model home program is perfect for educating electric cooperative members about energy efficiency.

“We also teach members that anyone can build any new home to perform energy efficiently, with exceptional comfort and with very reasonable utility bills,” Curry said.

Contact the Electric Cooperatives of Arkansas for a complete packet of energy efficiency construction literature at communications@aecc.com.

Components for Building an Energy-Efficient Home

Established components and guidelines are utilized to ensure that a model home meets the highest standards of energy efficiency. It is far more cost-effective to incorporate energy efficiency into a new home than to retrofit later.

When building a new home, remember the law of thermodynamics, which says heat moves from high temperature regions to low temperature regions. In other words, heat always moves to cold. So in Arkansas, the hot summer temperatures always attempt to gain access to an air-conditioned home. Conversely, the warmed air in a home tries to escape during the winter.

The following components and measures create obstacles and dramatically impede the law of thermodynamics. The effect equates to lower utility bills and a more comfortable home.

Foundation

If the foundation is a concrete slab, insulate perimeter of slab using 1” extruded polystyrene foam board. Place it between the outer edges of the slab and foundation. It should extend vertically 4 inches and 24 inches horizontally under the edge of the slab.

If the foundation has a crawl space, insulate inside of stem wall with foam or cellulose, a heavy plastic or vinyl ground cover should be used as a moisture barrier, and close all vents. If this method is used to insulate a crawl space, it is critical that the elevation of the ground in the crawl space be higher than the ground elevation outside the crawl space. It is also critical there are no standing water or moisture problems within the crawl space. Insulating the slab keeps its temperature similar to that
of the conditioned space. Insulating and sealing the crawl space stops sharp contrasts in temperature and humidity. It’s similar to an insulated basement.

**Hot Water Lines**

Hot water lines in a concrete slab must be insulated with foam tubing or equal. A concrete slab acts as a heat-sink and will cause the heat from non-insulated hot water lines to quickly dissipate into the slab. Remember, a concrete slab is nearly the same temperature of the ground, unless of course it’s insulated. A homeowner spends money to heat water; keep it hot and ready for use by insulating properly.

**Framing**

Energy experts have determined standard 2" x 4" framing and proper insulation may be used in high efficiency home construction. However, conventional corner and tee framing are prohibited. Past construction methods left corners and partition walls without proper insulation, causing moisture, mold and mildew to develop. Corners and tees are areas that can affect the R-value of the exterior wall. The framing illustration shown is required to maximize insulation value in those areas. Framing energy corners and tees requires less lumber and does not diminish supporting strength.

**Caulking and Foam Insulation**

An important measure to achieve energy efficiency is reducing air infiltration. Inexpensive caulking and foam sealants can seal air voids. Begin by using expanding foam to seal electrical and plumbing penetrations made in the top and bottom plates, and the inner and outer walls. On outside walls, caulk joints where two boards meet including top and bottom plates. IF IN DOUBT, CAULK IT. Caulking should be performed from the inside of the dwelling with a good silicon-based latex caulk. When caulking around doors and window jams, use non-expanding foam. Expanding foam may exert pressure on the window or door frame and cause damage.
Windows

Windows should be constructed from wood or vinyl, double or triple glazed, and with low-e glass. A U-factor and solar heat gain coefficient (SHGC) of .31 or lower are recommended. Look for windows with a decal indicating they were tested by the (NFRC) National Fenestration Rating Council. Low-e windows reflect heat back into the conditioned area and are great in the winter. U-factor is the inverse of R-value. So, a lower U-factor is good and indicates the window has a low heat loss rate. SHGC is a measure for the amount of solar radiation that passes through a window. Hence a lower SHGC is better for the southern climate.

Cellulose or Foam Insulation

Insulation is intended to retard the flow of heat from warmer areas to colder areas. Proper insulation pays for itself by reducing the equipment size required to heat and cool the home. It also reduces overall heating and cooling costs. Cellulose or foam insulation is required. Fiberglass is prohibited. An R-45 is required for the attic. Currently, cellulose insulation is far less costly that foam insulation. Cellulose insulation made with recycled newspaper began in the 1950s and came into general use in the U.S. during the 1970s. Cellulose insulation by its very nature is an environmentally friendly green product. It’s treated with borate to provide the highest Class I fire retardant rating. Also, cellulose is insect resistant and provides noise reduction. Damp spray applied cellulose is used for applying cellulose to new wall construction. The only difference is the addition of a very small amount of water to the cellulose while spraying. In many cases the contractor also mixes in a very small percentage of adhesive or activates a dry adhesive present in the cellulose. Wet spray allows application without the need for a temporary retainer. In addition, wet spray allows for an even better seal of the insulated cavity against air infiltration and eliminates settling problems. Damp-spray installation requires that the wall be allowed to dry for a minimum of 24 hours (or until maximum of 25 percent moisture is reached) before being covered.
House Breathing

“House breathing” is a term that has been around for decades. The thought is a breathing house creates a better living environment. However, it’s quite the contrary. House breathing is actually uncontrolled air infiltration that can rob energy savings and comfort from your home. Furthermore, excessive air infiltration introduces dust, dirt, pollen, humidity and other allergens into your home. Not to mention the heating and cooling unit is working overtime to keep the living areas comfortable. No home can be built air-tight nor should it be. Following these building guidelines enables the proper construction with acceptable natural air changes per hour.

Metal Ductwork

Metal ductwork is required. Each joint must be sealed with duct mastic or mastic tape. Flex duct is prohibited. If the ductwork is in the attic, when possible lay the ductwork on the ceiling joists and cover as much as possible with insulation. Installation in the crawlspace is acceptable. Rigid PVC ductwork is acceptable in concrete slab application. Sealing the ductwork properly keeps it from becoming disconnected and assures virtually 100 percent of the conditioned air stays inside the conditioned building envelope. The number one area your energy dollars are spent is for heating and cooling. Keep the conditioned air inside the duct and your building envelope by sealing them properly.

Radiant Barrier Roof Decking

Radiant barrier roof decking is required. The shiny foil backing is installed facing downward or toward the attic. Face the shiny side outward for gable applications. During the hottest months in Arkansas, a felt-shingled roof can reach temperatures in excess of 160 degrees. That is why an attic is unbearable in the summertime. However, radiant barrier roof decking can reduce internal attic temperatures up to 50 degrees.

Insulated Contact Air Tight Recessed Lights

If recessed lights are used, they must be insulated contact air tight (ICAT) rated fixtures. Using ICAT fixtures does not enable air infiltration and they can be covered with insulation.

Lighting

Compact fluorescent lamps (CFL) are recommended over standard Incandescent bulbs. CFLs last up to 10 times longer than their counterpart. They also cost 75 percent less to operate and produces less heat. It surprises some consumers to learn that the energy required for standard Incandescent bulbs produces 90 percent heat and 10 percent light. Imagine a hot summer day with a house full of Incandescent bulbs turned on at the same time. This represents a “heat gain.” During the summer, heat from Mother Nature is constantly trying to get into an air-conditioned house. Then to add insult to injury, the heat gain from the incandescent bulbs, appliances, people, pets, cooking and other sources cause the air-conditioner to work overtime. Installing CFLs can dramatically reduce additional heat gain into a home.

Ridge Venting

Ridge vents with continuous soffit venting are required where applicable. Ventilating the attic space creates natural convective air flow and allows moist air to escape. A properly ventilated attic will not enable the formation of mold or moisture. Plus the attic stays cooler during the summer months.
**Marathon Water Heater**

The high energy-efficient Marathon water heater manufactured by Rheem is required. The Marathon has a lifetime warranted tank and is guaranteed to never leak or rust as long as a person owns their home. Units have an energy factor of .91 or higher. Contact your local electric cooperative to purchase a unit. For additional details, visit [www.marathonheaters.com](http://www.marathonheaters.com).

**Heating and Cooling**

The home must be heated and cooled with an air-source heat pump or geothermal system. The minimum SEER rating for the heat pump is 13 SEER. A Manual-J load calculation must be conducted to determine the amount of heating and cooling required for the home.

To learn more about geothermal heating and cooling and the installation process, [click here](http://www.aecc.com/energy-efficiency/model-home-program#).

**Return Air**

Ductwork sizing is important to obtain the proper cubic feet of supply air for each room. Construction software parameters for air infiltration must be set to “Best” to assure proper sizing. The return air must have two square feet for each ton of heating and cooling. For instance, a three-ton unit must have six square feet of return air. If there is not enough area available for properly sized return air, two return air systems may be utilized. A heating and cooling system can only supply the same amount of air that can be obtained from the return.

**Supply Registers**

Supply air registers should be located toward the outside walls, and air should wash the outside walls when the unit is running.

**Thermostat**

Programmable or set-back thermostats are not required. Homeowners should tell the heating and cooling contractor what temperature they are most comfortable during the winter and summer. Doing so enables the correct design temperature during the Manual-J load calculation. Also, when using air or ground-source heat pumps, set the thermostat and refrain from making adjustments. Simply set it to the desired temperature. Do not locate the thermostat on outer walls, near doors and windows, and away from major appliances. Consult a heating and air contractor for additional information.

**Garages**

The garage walls and ceiling must be insulated. The garage door must also be insulated.

**Cook-tops**

Cook-tops must be vented to the exterior of the home and not into the attic or living space. Doing so vents latent heat/moisture outside the conditioned air space. Venting into the living space causes the cooling unit to work harder in order to remove the humidity. Venting into the attic can cause moisture, mildew or mold issues if the home has inadequate ventilation.

**Humidity-Sensing Exhaust Fans**

Humidity-Sensing exhaust fans must be installed in bathrooms to remove excess moisture. Venting to the outside is the preferred method. Excess moisture inside the conditioned air space can lead to the formation of mildew and mold.

**Electric Consumption Metering**

The sponsoring electric cooperative may meter electric consumption of the Marathon water heater and heating and cooling system separately. Doing so enables the utility to monitor consumption and the guaranteed performance.
Energy Efficiency

Old Appliances

Major home appliances are not meant to last forever. Most major appliances have a planned obsolescence of 10 years. If a major appliance provides more than 10 years of service, a consumer has certainly gotten his money’s worth... or have they?

Most would likely admit if the refrigerator is not broken, there is no need to fix it. Also, many homeowners will not consider replacing appliances until the kitchen needs remodeling or they are moving into a new house. Homeowners often will take the repair approach because the repair cost is less expensive than purchasing a replacement unit.

The reality is as appliances age, their overall energy efficiency can drop significantly due to aging parts, malfunctioning controlling devices, bad seals and other components. For instance, a bad thermostat on a dryer will cause it to continue drying even when clothes are dry. A bad seal on the freezer or refrigerator will cause the unit to cycle frequently. Speaking of old refrigerators and freezers, many Americans keep one or more in the garage, which is an unconditioned air space. During warmer months, the unit cycles much longer in order to keep its contents cool.

Older refrigerators equate to additional energy consumption. Running an additional older model unit can consume up to 66 percent more energy than a newer model that is ENERGY STAR® equivalent. Even though a consumer may have gotten their money’s worth out of an appliance, you may be spending far more on electricity than the unit is worth. For instance, it is not uncommon for older model refrigerators and freezers to average $1 per day to operate. It is not always obvious when an older appliance has become an energy waster. But it is a safe bet that if a major appliance is more than 10 years old, there is an ENERGY STAR® replacement available that can save money over the long haul.

Today’s technology is a friend when it comes to energy efficient appliances. Older motor and controller technology is less efficient than today’s technology. For instance, programmability and energy saving functions are available on many appliances. Energy-efficient clothes dryers are available with humidity sensing controls that cause the dryer to shut down when clothes are actually dry. Energy-efficient washing machines have water saving features, motors, and a high-speed spin cycle that removes virtually all of the water from clothing. This allows for less drying time.

For a complete list of energy saving appliances, visit www.enerystar.gov and click on “Appliances” in the menu.

Click Here learn how to choose the right refrigerator.
Energy Efficiency

LED Lights, Holiday Energy Savings

Consider using LED lights during the holiday season. LEDs use 95 percent less electricity than conventional painted or ceramic bulbs.

Click here for more information.
LED (light emitting diode) holiday lights are a shining example of the fruits of research and development efforts to increase electrical energy efficiency. Consider the advantages LEDs have over traditional incandescent lights:

- **Efficient** – LEDs save up to 98% of the electricity that is needed to power conventional painted or ceramic coated bulbs.

- **Environmentally friendly** – The low electricity use of LEDs means less carbon emissions, and manufacturing LEDs is more environmentally friendly as well. They require no glass or tungsten, since LEDs do not have a filament like incandescent bulbs; electron movement in semiconductor chips is what causes illumination.

- **Durable** – LEDs are encased in hard-to-break plastic versus the more fragile glass of incandescent lights. Because the LED is electronic, its lifetime is up to 10 years.

- **Practical** – LEDs come in standard packaging of 25- to 100-bulb strands that can be connected together to provide a seamless string. The long life of LEDs means that replacing bulbs will be rare, reducing maintenance.

- **Safe** – LEDs generate much less heat when they operate so they are cool to the touch, and are less likely to overload a circuit.

- **Attractive features and colors** – LEDs come in traditional shapes, sizes, and colors. LED strings with desired features such as blinking and flickering are also available.

Is it worth paying up to 100 times more for power for incandescent holiday lights? The lights shown on the left in each photo are efficient LEDs and those on the right are conventional incandescent lights.
LED holiday lights are typically a little more expensive to buy than their incandescent counterparts, but they virtually pay for themselves in the first year's electricity savings, and thereafter they are the gift that keeps on giving.

- Remember the "Christmas Vacation" movie character Clark Griswold, who lit his house with 25,000 bulbs? His electricity bill would drop from $2,400 to $50 if he used energy efficient C9 LED bulbs.

- But, everyone can save by using LEDs. The electricity cost to light a holiday tree with LEDs is 13 to 17 cents per season, compared to 6 to 10 dollars for incandescent lights. Those who put up seasonal outdoor lighting displays realize even greater savings.

Green holidays – the potential savings if all the seasonal minilights were to be switched to LEDs:

- Electricity costs savings would exceed $250,000,000 – that's a lot of toys, turkeys and ties.

- Carbon emissions would be reduced by 400,000 tons per year – that makes for a cleaner, greener holiday.

Many cities and organizations across North America are switching to LEDs for their holiday displays. Some municipalities and utilities provide incentives for residents to switch as well, making for happier holidays for bill payers and taxpayers alike. For example:

- Walt Disney World wired Cinderella's Castle with over 200,000 LEDs, producing savings of thousands of dollars. With lighting decorations being used year round in many cases, switching to efficient LEDs becomes even more compelling.

- The Times Square ball that descends every year to ring in the New Year will be fully illuminated by LED lighting. Even though it’s twice as bright as the old ball, it will use about half the energy.

- The City of Boulder, Colorado is switching to LEDs for its Downtown Pearl Street Mall. Its citizens can go to a lighting exchange kiosk on the Mall to swap their traditional, working holiday lights for LEDs for $5 each (about half price). The old lights will be recycled by the city.

- Anaheim’s municipal utility offers gift cards to Home Depot, Starbucks, or Borders to help rebate the cost of LEDs: $10 cards for 25-150 lights, and $20 cards for more than 150 lights.

- Efficiency Maine, a program of the Maine Public Utilities Commission, provides downloadable in-store coupons worth $1.50 per LED string.

- Minnesota Power offers instant in-store rebates of $3.00 for LED holiday lights.

EPRI hopes you enjoy the pleasures of a traditional holiday by using lighting that increases efficiency, saves money, and preserves our environment for future generations. Deck the halls with boughs of holly – and LED lighting.

2 Based on 39 pound carbon per kWh, American Solar Energy Society

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Energy Efficiency

Frequently Asked Questions

1. What is green power?
   Green power is electricity generated from environmentally friendly and renewable resources, such as the sun, wind, and water, among others.

2. Why do you need contributions to build more?
   Building new power plants of any kind is expensive. The technologies associated with large-scale renewable energy production are not fully developed, which means that building such facilities is quite costly. Simply put, it costs much more to develop renewable energy than it does to build more traditional generation. That's why we are asking for your help.

3. How does it work?
   In essence, you will pay a premium on some or all, if you choose, of the power that you use each month, part of which comes from the Electric Cooperatives of Arkansas' three hydropower plants. Your contribution, or premium, is based on blocks of power ranging from $5 on 100 kilowatt-hours of electricity used to $100 for 2,000 kilowatt-hours. Please note that the contribution will be in addition to your regular monthly electricity costs based on existing rates.

4. Am I eligible?
   Members of participating electric cooperatives are eligible to join GreenPower.

5. How do I join and how will I be billed?
   Click here to select your cooperative to sign up. Billing is dependent for each cooperative. You will need to contact your local cooperative for more information regarding billing.

6. Can I cancel my membership?
   Yes. GreenPower is completely voluntary. (Find out specific details from each cooperative.)

7. Will my home's power come directly from "green" sources?
   Not necessarily. Your home receives its electricity from the main power grid, which transports power generated from various energy sources. It is impossible to isolate an actual 'green' electron and route it to your home. Your participation, however, will help the Electric Cooperatives of Arkansas add more green power resources to the grid and further promote the effective use of all power resources.

8. What will the GreenPower fund be used for?
   Money from the GreenPower fund may be used for the following purposes: 1) To build green power facilities that the cooperatives determine are feasible; 2) to purchase green power from the electricity market, if it is affordable and available; 3) to further help the cooperatives educate members about ways to make their homes and businesses more energy efficient.

9. Will green power replace the use of coal-fired generation?
   Not any time soon. For the time being and near future, at least, green energy resources, such as wind, solar, and hydropower, cannot meet more than a small percentage of the nation's energy needs, primarily because power produced from such sources is intermittent in nature. Simply put, the wind doesn't always blow, the sun doesn't always shine and the water doesn't always flow at required levels to produce electricity. Since electricity cannot be stored, such methods cannot be counted on to provide the continuous flow of electricity our society demands.

For now, coal remains the best choice for the bulk of our electricity production. About 70 percent of the cooperatives' generation comes from coal-fired power plants, which meet all state and federal environmental regulations. Furthermore, the cooperatives are committed to the development of new technology that will make coal plants even cleaner in the future. In addition, we will continue to review green energy resources to determine what may be viable for our generation portfolio.
about an hour ago: **New industry for Clinton will create 224**

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Electric Cooperatives of Arkansas

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http://www.aecc.com/energy-efficiency/green-power/faq/
Just as they were pioneers in the development of rural electrification, the Electric Cooperatives of Arkansas were also at the forefront of the renewable energy movement. Long before "green power" became a household phrase, the cooperatives began a commitment to develop hydropower along the Arkansas River to the fullest extent possible.

Twenty years and $330 million later, the Electric Cooperatives of Arkansas operate three environmentally friendly hydropower plants that provide low-cost, clean energy to more than 490,000 Arkansans across the state. In addition to those plants, they own five other power plants and co-own portions of three others. These plants, which burn natural gas and low-sulphur coal, meet or exceed all federal environmental requirements.

As we continue to look for innovative ways to provide Arkansans with environmentally sound power resources, we are asking for your help. New technology needs to be developed, and that is costly. To support this effort, we are offering a new GreenPower program in which you can contribute to the development of additional renewable energy resources, as well as further help spread the word about ways to use energy more efficiently.

Click here to sign up for GreenPower!
about an hour ago New industry for Clinton will create 224
Energy Efficiency

**GE GeoSpring™ Hybrid Electric Water Heater**

The new industry-exclusive GE GeoSpring™ Hybrid Electric Water Heater is designed to provide the same hot water homeowners are accustomed to, but requires only about half the energy to produce it. For example, based on the same standard tank water heater that uses approximately 4,800 kWh per year, the new GE GeoSpring™ Hybrid Water Heater is designed to:

- Consume up to 62% less energy than a standard electric water heater
- Result in energy savings of $320 per year

*Based on DOE test procedure and comparison of a 50-gallon standard electric tank water heater using 4,881 kWh per year versus the GE heat pump water heater using 1,856 kWh per year.

**How It Works.** Click here to learn more about how the GeoSpring™ saves money.

The GE GeoSpring™ Hybrid Water Heater combines energy-saving heating technology with traditional electric heating systems used in most standard water heaters on the market today without sacrificing the amount of hot water it can deliver.

This hybrid technology is designed to absorb heat in ambient air and transfer it into the water. Since it requires much less energy to absorb and transfer heat than it does to generate it - as a standard electric water heater would - the GE GeoSpring™ Hybrid Water Heater provides the same amount of hot water while using less energy.

The GE GeoSpring™ Hybrid Water Heater features a user-friendly electronic control system that offers both simplicity and flexibility, giving consumers as much or as little control of operating modes as they like. Water temperature may be precisely set from 100 to 140 degrees to maximize energy benefits and comfort.

The unit exceeds the ENERGY STAR® minimum requirement of a 2.0 energy factor (EF) with a 2.35 EF or 235% efficient.

Now available through your local electric cooperative or by calling 1-800-451-8061 between 8:00 a.m. and 5:00 p.m. Central Time.


**Arkansas Energy Office Rebate Information:**
[www.arkansaseenergy.org](http://www.arkansasenergy.org)
New industry for Clinton will create 224
Exhibit Three
Renewable Resources

Hydroelectric Power

Hydropower: A Cooperative Cornerstone

The Electric Cooperatives of Arkansas completed the first of three hydropower plants on the Arkansas River in one of their most ambitious generation projects ever in December of 1988.

The plant, the Clyde T. Ellis Hydroelectric Generating Station, was built at the James W. Trimble Lock and Dam near Fort Smith. It marked the cooperatives' commitment to a long-term, low-cost power source for their members, as well as their dedication to environmentally friendly power, long before it was fashionable to do so. Later in the 1980s and 90s, the cooperatives completed two other hydropower plants, making the total investment in renewable energy resources at about $330 million.

Although AECC didn't begin building hydropower plants until the 1980s, the cooperatives had long been familiar with the benefits of hydropower. From their very inception, they depended on hydropower from federal dams to serve their members. In fact, without hydropower, it could be argued that the cooperatives might not have been able to survive.

Hydroelectric Generating Station

Hydropower History

Two years before President Franklin D. Roosevelt's signing in 1935 of the Rural Electrification Act, which created the Rural Electrification Administration (REA) and provided funding for the development of cooperatives across the country, he signed the Tennessee Valley Authority Act of 1933. This law laid the first cornerstone for the formation of the electric cooperatives by providing a vital building block for the program - access to hydropower from the federal government's dams.

Publicly owned utilities first got access to the power in 1902 with the passage of the Reclamation Act, which was designed to spur growth in the West by reclaiming the arid region through the construction of dams to divert and store the available water. With the 1933 law, cooperatives were added to the "preference" list, and Arkansas' electric cooperatives have benefited ever since. In the 1950s, when
many of the dams were being built in Arkansas and surrounding states, the power they produced was not the least expensive electricity being produced. But the cooperatives didn't have many alternatives, so they took it. Today, hydropower is the lowest cost power resource, especially during periods of peak electricity demand.

AECC continues to buy federal hydropower from the Southwestern Power Administration (SPA), a Tulsa, Oklahoma-based government agency that markets power from 24 federal dams. Under contract with the SPA, AECC is entitled to 189 megawatts of power annually. Because the power from SPA is available for a limited number of hours during the year, AECC uses most of it during its peak demand for power.

AECC Eyes the Arkansas River

While the U.S. Army Corps of Engineers constructed major dams on the Arkansas River through the McClellan-Kerr Arkansas River Navigation Project, hydropower wasn't a top priority and several were built without powerhouses. At a 1999 ceremony commemorating the completion of AECC's third hydropower plant on the Arkansas River, Dale Bumpers told attendees that when he joined the Senate in 1975, he wanted to build hydropower plants on every dam on the Arkansas River. But he said he quickly discovered that there was no support from the federal government to build new hydropower plants, and the private sector was also disinterested. That's because the investment wouldn't provide a quick payback, but would for the long term. Bumpers added that he was elated when AECC applied in 1978 for federal licenses to build the plants.

The Corps did build powerhouses at five Arkansas River dams that had the greatest potential for hydropower generation. But, because energy was cheap at the time, the government decided it wasn't worth the investment to put hydropower plants at the other locks and dams.

However, in the late 1970s, power costs were again on the rise and AECC began looking for ways to lower those costs. That's when the cooperatives turned to the Arkansas River. It was not a decision that was made easily. Before construction began, AECC conducted feasibility studies and went through a lengthy process to obtain the federal licenses for the hydropower plants. The first plant, the Clyde T. Ellis Hydroelectric Generating Station, began operation in 1988 with an installed capacity of 32.4 megawatts and cost about $75 million to build.

Five years later, the Carl S. Whillock Hydroelectric Generating Station at the Arthur V. Ormond Lock and Dam near Morrilton was completed at a cost of $80 million. Its installed generating capacity is 32.4 megawatts.

The cooperatives began work on their third hydropower plant in 1994. This plant, located at the Wilbur D. Mills Dam near Dumas, was completed in 1999 at a cost of about $189 million. In 1999, cooperative leaders and dignitaries celebrated the construction of the plant, known as the Electric Cooperatives of Arkansas Hydropower Generating Station. It has an installed generating capacity of 102.6 megawatts.

Run of the River

AECC's hydropower plants are low-head, run-of-river plants. Run-of-the-river plants use the available water flowing downstream to generate electricity without ponding water or changing the rate of flow from what the Corps of Engineers would normally release. They are low-head plants, meaning that they operate at dams where the "head," which is the difference between water levels on the upstream and downstream sides of the dam, is typically around 20 feet or less. The power plants at the dams on the White River, for example, are high-head plants with heads measuring 100 feet or more.
There are no emissions, no solid wastes produced, no radioactive emissions and no dangerous chemicals used in the generation process. When hydro plants run, AECC displaces the burning of fossil fuels at coal- and oil-fired plants and, in the process, reduces emissions from those units.

According to estimates based on historical rivers' flows, AECC's three hydroelectric plants eliminate the need to burn 391,000 tons of coal or 1 million barrels of oil each year.

For the Long Run

With 20 years under its belt, the Ellis plant is going strong, as are the others. Click here for the total megawatt-hours produced by AECC's hydroelectric plants to date. The plants have estimated lifespans of 100 years, which means the cooperatives have a long-term resource that will only increase in value as fuel costs for other sources of generation, such as natural gas-fired power, continue to climb. Hydroelectric is low-cost power using a renewable resource and will benefit Arkansas' electric cooperatives for generations to come.
Hydroelectric Power History

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Environmentally Friendly Power

In addition to providing low-cost power, AECC’s plants provide environmentally friendly "green" power.
There are no emissions, no solid wastes produced, no radioactive emissions and no dangerous chemicals used in the generation process. When hydro plants run, AECC displaces the burning of fossil fuels at coal- and oil-fired plants and, in the process, reduces emissions from those units.

According to estimates based on historical rivers’ flows, AECC’s three hydroelectric plants eliminate the need to burn 391,000 tons of coal or 1 million barrels of oil each year.

**For the Long Run**

With 20 years under its belt, the Ellis plant is going strong, as are the others. Click here for the total megawatt-hours produced by AECC’s hydroelectric plants to date. The plants have estimated lifespans of 100 years, which means the cooperatives have a long-term resource that will only increase in value as fuel costs for other sources of generation, such as natural gas-fired power, continue to climb.

Hydroelectric is low-cost power using a renewable resource and will benefit Arkansas’ electric cooperatives for generations to come.

---

**New Industry for Clinton will create 224 new jobs**

Electric Cooperatives of Arkansas
Headquarters
1 Cooperative Way, Little Rock, AR 72209
Ph: 501-576-2100
Email: communications@aecc.com

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http://www.aecc.com/renewable-resources/hydroelectric-power/
Exhibit Four
Renewable Resources

Solar Power Project

AECI’s Utility Sales Tests Solar Power

The Arkansas Electric Cooperatives, Inc. (AECI) Utility Sales Department won’t be going off the grid anytime soon, but they are testing another source of power - solar energy.

In early 2009, the department purchased solar panels as part of a pilot program to test small-scale solar power systems to determine if AECI might add them to their product offerings.

Preformed Line Products installed the system which has 33 panels and cost about $47,000. In addition to the panels, the system has an inverter that converts the DC power produced by the panels to AC power that is used in the building. The system has a generation capacity of 7,000 watts.

AECI Solar Power System Installation
USSD Solar Plant overview

Date: 2/20/2013

Energy: 39,620.40 kWh

CO₂ avoided: 27,734.28 kg

Reimbursement: $18,522.54

Change the date for the complete page: 2/20/2013
Exhibit Five
ENERGY EFFICIENCY
IN A MANUFACTURED HOME

SAVE ENERGY | SAVE MONEY
LIVE COMFORTABLY

Electric Cooperatives
of Arkansas
Your Local Energy Partners
www.ecark.org
Site Your Home Properly

Make sure your dealer grades the site properly. Poor grading can lead to settling and moisture problems.

Have the long sides of your home face north and south and the short sides east and west to take advantage of the sun’s heat in winter and provide the greatest protection from the summer sun.

Limit the Sun

When possible, strategically position your home or plant trees to protect it from unwanted summer sun and act as a windbreak in winter.

Exterior solar shade screens can effectively shade east and west windows and enhance privacy.

While shading windows on the outside is most effective, using light colored shades or blinds to reflect sunlight back through the glass will also help reduce air conditioning costs.

Roofing

For metal roof homes, apply a reflective coating to reduce cooling costs and provide protection against water leaks.

If your home has a shingled roof, use light-colored shingles to keep attic space cooler.

Ductwork

Make sure ductwork is airtight and well insulated.

Seal any holes in the floor sheathing.

Make sure any ducts that cross over to another section are properly joined with a mastic sealer.

HVAC

If your home has an old or inefficient heating and cooling system, consider replacing it with a new Energy Star unit. Make sure it is properly sized for your home.

Save hundreds each year by upgrading from electric resistance heat to an electric heat pump.

Change return air filters monthly.

Have your system tuned up annually to maintain maximum efficiency.

Set the thermostat to 78° in the summer; 68° in the winter.

Insulation

Since the ceiling, wall and floor cavities for many manufactured homes are sealed, it is difficult to add insulation. However, some models have attic spaces in which you can install extra insulation and some insulation companies can blow insulation into the floor cavity.

In new homes, look for a minimum R-value of R-11 for walls, R-19 for floors, and R-30 for ceilings.

Make sure insulation has not shifted during transit before joining multi-section homes.

See that the “marriage walls” are airtight with foam gaskets installed between sections.

Seal all plumbing and wiring penetrations using expanding foam or caulk.

For more information, contact the Electric Cooperatives of Arkansas at 1-800-482-1277 or visit www.ecark.org.
Appliances and Furnishings
Always choose Energy Star products including appliances, HVAC and lighting.

Set the water heater to 120°.
Make sure the clothes dryer is vented to the outdoors and away from heating and air conditioning components.

Windows and Doors
If replacing windows, use insulated glass with a thermal break for metal frames and low-e glass.
Weatherstrip all doors and windows.
Install storm doors and windows.

Skirting
Install vinyl or metal skirting or a foundation wall to protect the home’s underbelly and duct connections.
Install a continuous vapor barrier — like heavy plastic — under the home.

Shop Wisely
Most manufacturers offer energy efficiency options for new homes. While they may add to the purchase price, they can save thousands of dollars over the life of your home and greatly increase its comfort and value.

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Little Rock, AR 72219-4208
501.570.2200

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COMPACT FLUORESCENT LAMPS
SAVE ENERGY | SAVE MONEY
LIVE COMFORTABLY

Electric Cooperatives of Arkansas
Your Local Energy Partners
www.ecark.org
What is a CFL?

A compact fluorescent lamp, or CFL, is designed to fit in a standard residential socket replacing an incandescent bulb. While they cost a bit more than a standard bulb, real savings are realized over the life of the CFL, which will last up to 10 times longer and use 75 percent less energy.

In the case of a CFL, the word ‘fluorescent’ is deceiving. CFLs are designed to emit a soft, clear white light, much like that from the familiar incandescent bulb.

But that’s where the similarities end. You see, if every Electric Cooperative of Arkansas member replaced just one standard bulb with a CFL, we could:

- Save enough energy to power 13,000 average homes for one year
- Save more than $14 million in energy costs
- Save 51,000 tons of coal
- Eliminate emissions equivalent to 13,874 cars on the road

As if those reasons weren’t enough, CFLs last ten times as long as a standard incandescent bulb — up to ten years! Just imagine your own savings if you took it upon yourself to change all your home’s bulbs!

For more information, contact the Electric Cooperatives of Arkansas at 1-800-482-1277 or visit www.ecark.org.

How to Choose and Where to Use CFLs

Energy Star qualified CFLs provide the greatest savings in fixtures that are on for a substantial amount of time each day. At minimum, Energy Star recommends installing qualified CFLs in fixtures that are used at least 15 minutes at a time or several hours per day. The best fixtures to use qualified CFLs in are usually found in the following areas of your home:

- family and living rooms
- kitchen
- dining room
- bedrooms

Who would have thought energy efficiency could be as easy as changing a light bulb?

Yes, together we can make a difference.
By replacing just one incandescent bulb with an energy-saving CFL, you will:

- Use 75 percent less energy for the same amount of light from an incandescent bulb
- Save more than $58 over the life of the bulb
- Save time, since CFLs last up to 10 times longer
- Enjoy warm, high quality light
GEOTHERMAL HEAT PUMPS
SAVE ENERGY | SAVE MONEY
LIVE COMFORTABLY

Electric Cooperatives of Arkansas
Your Local Energy Partners
www.ecark.org
The Geothermal System

Geothermal systems use the earth to heat and cool your home or business. That energy also provides free hot water during summer. When it comes to being green and renewable, geothermal systems can’t be beat.

Enjoy Natural Comfort
Replace your heating and air conditioning unit with one that’s recommended by Mother Nature. The all-new geothermal heat pump uses the constant temperature of the earth to keep your home toasty during the winter and cool in the summer. On top of that, it can give you free hot water during the warm summer months.

How Does it Work?
Geothermal/ground source heat pumps are electrically powered systems that take advantage of the earth’s 58-degree ground temperature to provide heating, cooling, and hot water for homes and commercial buildings.

Money-Saving Investment
Geothermal/ground source heat pumps can cut your home or business heating and cooling costs by up to 50 percent and provide hot water free or at substantial savings.

Durability
Geothermal/ground source heat pumps last longer than conventional systems because they are protected from harsh outdoor weather. The unit is housed indoors and the loop is underground.

Instant Comfort
In the winter, a geothermal system moves warm air throughout your home or business, creating an even comfort level. This helps to even out hot or cold spots and eliminates the cold air blasts common with fossil fuel furnaces.

For more information, contact the Electric Cooperatives of Arkansas at 1-800-482-1277 or visit www.ecark.org.

Low Maintenance
Geothermal/ground source heat pumps have fewer mechanical components, making them more reliable and less prone to failure. The ground loop has an expected life of more than 50 years and requires no maintenance.

Something for Free
During the summer, when the system is in a cooling mode, your hot water is produced free as a by-product of the thermal process. In winter, the system uses the heating mode to heat a portion of your hot water.

Environmental Benefits
Geothermal systems conserve energy. The systems move heat that already exists rather than using an energy source to create heat. Geothermal systems also reduce the amount of toxic emissions in the atmosphere. Geothermal systems do not rely on outside air, so the units keep the air inside of buildings cleaner and free from pollens, outdoor pollutants, mold spores and other allergens.

A Cost Comparison Of Home Heating And Cooling: Annual Operating Costs *

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>1,500 Sq. Ft. Home</th>
<th>2,500 Sq. Ft. Home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geothermal Heat Pump</td>
<td>$386</td>
<td>$644</td>
</tr>
<tr>
<td>LP Furnace and A/C</td>
<td>$1,220</td>
<td>$2,014</td>
</tr>
<tr>
<td>Gas Furnace and A/C</td>
<td>$1,356</td>
<td>$2,241</td>
</tr>
<tr>
<td>Air-Source Heat Pump</td>
<td>$705</td>
<td>$1,133</td>
</tr>
</tbody>
</table>

*Energy use data based on calculations reflecting a home of average construction and utilization. It values, Geothermal heat pump SEER 10, COP 4.5, LP source heat pump SEER 13, HSPF 2.8 (propane) and natural gas AFUE 80%. Standard A/C SEER 10. Utility rates based on $0.085 per kWh, $1.65 per therm, natural gas, $4.75 per gallon propane.
Install a Geothermal Heat Pump and:

- Get free hot water during the summer
- Save up to 50 percent of heating costs
- Save up to 75 percent of cooling costs
- Have minimal maintenance costs

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AIR SOURCE HEAT PUMPS
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www.ecark.org
How Does it Work?

The technology in an air source heat pump is similar to what you would find in your kitchen refrigerator. Using a simple refrigeration cycle, refrigerators remove heat from your food and drinks and reject it into the kitchen. This process of moving heat is achieved by taking advantage of the energy stored and released when a refrigerant changes from a liquid to a gas.

Simply put, a heat pump can move heat into or out of your home. In the summer, it acts like a standard air conditioner and moves heat from the inside outdoors. It does exactly the opposite in the winter, capturing heat from the outdoors and moves it into your home, keeping you and your family warm.

There are two basic kinds of air source heat pumps. Your home's layout will determine which will work best for you.

Packaged Heat Pumps

The packaged heat pump is a self-contained unit that allows the compressor and both heat exchangers to be located outside your home. The unit uses ductwork to heat and cool your entire home. There are several types of packaged heat pumps which may be used for single rooms and don't require ductwork.

Split-System Heat Pumps

The second more common type, called the split system heat pump, allows you more options for installation location. The indoor air-handling unit and heat exchanger are separate from the compressor and the outdoor exchanger. Whole-house heating and cooling occurs via ductwork.

Benefits of Air Source Heat Pumps

- May be used for cooling and heating.
- Reduces utility bills up to 50 percent.
- Reduces emissions.
- Very low maintenance.
- No flammable fuel is used at the point of heating, reducing potential danger to users and eliminating the need for gas or fuel.

For more information, contact the Electric Cooperatives of Arkansas at 1-800-482-1277 or visit www.ecark.org.

A Cost Comparison Of Home Heating And Cooling: Annual Operating Costs

<table>
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<tr>
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<td>$644</td>
</tr>
</tbody>
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*Energy use data based on calculations reflecting a home of average construction and installation R-values. Geothermal heat pump SEER 10 COP 4.2, air source heat pump SEER 13 HSPF 10.8, LP (propane) and natural gas A/C 80%. Standard A/C: 15 SEER 10 HSPF. LP rates based on $1.50 per gallon, $1.98 per therm of natural gas, $1.25 per gallon propane.
Tips for Maximizing Heat Pump Efficiency

• Make your home as energy-efficient as possible (with proper insulation, energy efficient windows, etc.) to allow for a smaller heat pump system with shorter duct lengths.

• Installing ducts inside your home’s insulation and air barrier is a major energy saver.

• Insulate your ducts to R-8 if they must be located in an attic or crawl space.

• Locate the outdoor unit on the north side of your home if possible or in the shade.

• Specify that the measured air leakage through your new ducts be less than 10 percent of your system’s airflow.

• Tell your contractor that you want a return register in every room.

• Make sure ductwork is sealed well. Clean or replace filters regularly.

• Clean outdoor coils often.

• Remove plant life and debris from around the outdoor unit.

• Clean evaporator coil and condensate pan every two to four years.

• Clean the blower’s fan blades.

• Clean supply and return registers and straighten their fins.

• Schedule professional service annually.

The heating efficiency of an air source heat pump is measured as the Heating Seasonal Performance Factor (HSPF), and typically ranges from 7.7 to 8.1. Cooling efficiency for these heat pumps is indicated by the Seasonal Energy Efficiency Ratio (SEER), which typically falls between 13.0 and 19.0. The higher the number, the better the system. Always look for the Energy Star® label.

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MARATHON WATER HEATERS
SAVE ENERGY | SAVE MONEY
LIVE COMFORTABLY

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of Arkansas
Your Local Energy Partners
www.ecark.org
Buy the water heater with staying power.

*Buy the Marathon water heater and get more than you bargained for – a lifetime guarantee. Nothing else you can do for your home will give you the peace of mind that comes with a Marathon. You may also qualify for financing programs through your local electric cooperative. Give them a call for details.*

A Lifetime Commitment

When the Marathon water heater was developed more than 15 years ago, engineers had three goals in mind:

- A true lifetime warranty
- Energy efficient
- Installation friendly (lightweight and easy to connect)

Lifetime Warranty

A true lifetime warranty is a promise that your Marathon water heater will last the life of your home. It could quite possibly be the last water heater you will ever buy. Based on the success of plastic brine tanks used for more than 30 years in the water softening industry, the Marathon water heater is made to last.

Energy Efficient

The design and construction of the Marathon water heater allows it to store and insulate your home’s water much the same as a carafe or Thermos™. Energy is used to heat the water one time only, saving money and energy from re-heating stored water at the time of use.

Installation Friendly

Lightweight and easy to connect is what we mean when we say the Marathon water heater is installation friendly. The tank comes complete for easy, professional installation.

Energy Answer

Let the Marathon water heater become your silent partner in the quest to save energy and money. You’ll never have to worry about a leaky or faulty water heater because the Marathon water heater is seamless. Its ergo-dynamic design reduces sediment build-up and eliminates leaks. It also keeps a large supply of water hot and ready to use at the turn of a faucet. And you won’t even know it’s there until you see the energy savings on your utility bills. The Marathon water heater may be the last water heater you’ll ever buy.

<table>
<thead>
<tr>
<th>Gallon Capacity</th>
<th>Energy Factor</th>
<th>Diameter In Inches</th>
<th>Height In Inches</th>
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<tr>
<td>30</td>
<td>.94</td>
<td>21 5/8</td>
<td>53</td>
</tr>
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<td>40</td>
<td>.94</td>
<td>21 5/8</td>
<td>65 1/2</td>
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<td>50</td>
<td>.94</td>
<td>23 1/2</td>
<td>66 3/4</td>
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<td>47 1/4</td>
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<tr>
<td>105</td>
<td>.91</td>
<td>30 1/4</td>
<td>70 3/4</td>
</tr>
</tbody>
</table>

4500 watt dual elements standard
Meets ASHRAE standard 90A
See your Marathon dealer for pricing, availability and complete warranty information.

Marathon WATER HEATERS

For hot water that’s there when you need it and when you don’t.

For more information about a free home energy audit call 1-800-482-1277 or visit www.ecark.org.
The MARATHON Advantage

- Advanced design outlasts the competition
- Durable water heater with a warranty to match
- No seams...No leaks!
- Lightweight
- Easy to install

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INTRODUCING THE WATER HEATER THAT LOWERS YOUR UTILITY BILLS
INCREASED SALES FOR YOU,
MORE SAVINGS FOR YOUR CUSTOMERS.

To really make an impact on utility bills, look to the second biggest energy consumer in the home: the water heater.

The GeoSpring™ Hybrid Water Heater delivers all the hot water you need and saves you $325 every year*. That means it pays for itself in just 2-3 years.**

GEH50DEEDSC

- Qualifies for state and local utility rebates and tax credits
- 50 gallon capacity makes for a great replacement for a 40- or 50-gallon standard electric water heater
- Provides the same amount of hot water as a standard electric 50-gallon water heater
- Easily replaces your current electric water heater by using the same water & electrical connections
- 4 operating modes allows you to customize your energy savings & water heater performance
- Vacation setting saves money while you are away
- Electronic controls make it simple to change the temperature or operating mode
- 10 year limited warranty*** on all parts

* Based on DOE test procedure and comparison of a 50-gallon standard electric tank water heater using 4879 kWh per year vs. the GeoSpring hybrid water heater using 1430 kWh per year.
** Based on estimated consumer product cost of a GeoSpring hybrid water heater vs. standard 50 gallon electric water heater and $125 difference in annual operating costs.
*** See written warranty for details.

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ecomagination

www.geappliances.com/geoSpring

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Pub. No: 21-00222  PC66963
Hot Technology
Hot Savings

The hot, new GeoSpring™ hybrid water heater.
Hybrid water heater technology helps you
SAVE on your 2nd largest household energy expense.

Did you know that the water heater is the second highest energy user in your home? The Electric Cooperatives of Arkansas are partnering with national appliance manufacturer General Electric to offer a new hybrid heat pump electric water heater. The GeoSpring™ Hybrid Water Heater consumes up to 62% less energy than a standard electric water heater.

ENERGY-SAVING BENEFITS
- Provides the same amount of hot water while using less energy.*
- Designed to absorb heat in ambient air and transfer it to heat the water.

MONEY-SAVING BENEFITS
- Save approximately $320 per year – that's $3,200 savings in energy costs over a 10 year period.
- Save up to 62% on energy bill tied to water heating.**
- Exceeds ENERGY STAR® standards with a rating of 2.35 energy factor.
- 10-Year Limited Warranty
  > One year limited parts and labor
  > Additional nine year limited parts

INSTALLATION
- Offers easy replacement of standard electric water heater.
- Fits in a similar footprint as a standard 50-gallon water heater.
- Uses existing water/electrical connections.

INCENTIVES
- Federal tax credit of 30% on the purchase and installation price. Some restrictions may apply.

For more information, contact:
Arkansas Electric Cooperatives, Inc. 1-800-451-8061

Arkansas Electric Cooperatives, Inc.
Your Local Energy Partners

*Based on 2300 KWh per year vs. standard 50-gallon tank usage of 4800 KWh per year
** Compared to 50-gallon standard electric water heater
## GeoSpring™ Hybrid Water Heater Dimensions & Weight

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
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</thead>
<tbody>
<tr>
<td>Overall Depth</td>
<td>21 3/4 inches</td>
</tr>
<tr>
<td>Overall Height</td>
<td>60 1/2 inches</td>
</tr>
<tr>
<td>Overall Width</td>
<td>21 3/4 inches</td>
</tr>
<tr>
<td>Approximate Shipping Weight</td>
<td>215 lbs</td>
</tr>
</tbody>
</table>

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**Arkansas Electric Cooperatives, Inc.**  
Your Local Energy Partners

For more information, contact:  

Arkansas Electric Cooperatives, Inc.  
1-800-451-8061
THE ELECTRIC COOPERATIVES OF ARKANSAS

THE MAGIC OF
Energy Efficiency

Save Energy. Save Money. Live Comfortably.

An informative and entertaining program about the importance of energy efficiency.
Appliances

Replace aging, inefficient appliances with Energy Star appliances. Look for the Energy Star label to select energy-efficient models. Energy Star models use much less power than their counterparts.

Wash full loads of laundry using cold water when possible. Don’t over-dry clothes, and clean the dryer’s lint filter after every load to maximize air circulation.

Use the energy-saving settings on refrigerators, dishwashers, washing machines and clothes dryers. Air-dry dishes by opening the dishwasher instead of using the heated drying cycle.

Keep your refrigerator or freezer at recommended temperatures of 37°F to 40°F for the refrigerator and 5°F for the freezer. Clean the coils regularly.

Cook smarter! Match the size of the pan to the heating element. Use electric pans, toaster ovens or microwaves for small meals. You will use less energy and reduce cooking time.

Turn off the television when no one is watching. Today’s state-of-the-art, high definition sets offer amazing viewing, but also use more electricity than older televisions. Use power strip cords and turn off when not in use.

Shut down the computer. Conserve energy by turning off or using sleep mode for computers not in use for two hours or more. Use power strip cords and turn off when not in use.

Water Heater

Set the temperature on water heaters to 120°F, and install an insulating blanket on the water heater (which should pay for itself in less than a year.) Consider replacing old units with a lifetime warranted, high energy-efficient Marathon water heater and save up to $100 per year.

Take a shower. In most households, it uses far less hot water than bathing.

To schedule The Magic of Energy Efficiency at your event, call Scott Davis at 501-517-7268 or visit www.ScottDavisMagic.com.
Practicing real energy efficiency is more than a popular trend. Paying attention to responsible electricity use and consumption can help to preserve resources, save money and improve comfort in homes and businesses.

**Lighting**
Replace traditional incandescent light bulbs with energy-efficient compact fluorescent bulbs which are up to four times more energy efficient and last nine times longer than incandescent bulbs. You could save up to $57 in electricity costs over the life of each bulb.

Turn off lights in rooms you aren’t using, or install timers or occupancy sensors to reduce light consumption.

**Heating And Cooling**
Service accordingly. Have heating and cooling systems tuned up in the fall and spring. Make sure ductwork is intact and sealed properly.

Clean or replace filters on air conditioners and heat pumps regularly. Use an air conditioner with a seasonal energy efficiency ratio (SEER) of 13 or higher. Use the proper size for your home. If building a new home, consider installing an energy efficient geothermal system to cool and heat the home. Contact a reputable HVAC contractor to properly size the unit required for your home.

Insulate. Make sure insulation levels are appropriate in the attic, exterior and basement walls, ceilings, floors and crawl spaces. You can increase the comfort of your home and reduce annual heating and cooling usage up to 10 percent just by investing in proper insulation—cellulose is recommended—and sealing air leaks.

Ceiling fans can bring energy saving benefits to the home. Most ceiling fans use only about as much power as a 100 watt light bulb. When used properly, ceiling fans can save money on utility bills year-round.
Scott Davis is a magician and electricity educator. His entertaining and informative programs about electricity have been seen by over a million people across America. He's been written-up in countless utility industry publications and newspapers. Currently, he performs more than 300 live shows a year throughout the country. For more information, visit www.ScottDavisMagic.com.
Smart Energy Tips

Save Energy. Save Money. Live Comfortably.

Electric Cooperatives of Arkansas
Your Local Energy Partners

www.SmartEnergyTips.org
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Insulate. Make sure insulation levels are appropriate in the attic, exterior and basement walls, ceilings, floors and crawl spaces. You can increase the comfort of your home and reduce annual heating and cooling usage up to 30 percent just by investing in proper insulation—cellulose is recommended—and sealing unwanted air infiltration.

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Keep your refrigerator or freezer at recommended temperatures of 37°F to 40°F for the refrigerator and 5°F for the freezer. Have the coils cleaned at least twice per year.

Cook smarter! Match the size of the pan to the heating element. Use electric pans, toaster ovens or microwaves for small meals. You will use less energy and reduce cooking time.

Turn off the television when no one is watching. Today’s state-of-the-art, high definition sets offer amazing viewing, but also use more electricity than older televisions. Use power strip cords and turn off when not in use.

Shut down the computer. Conserve energy by turning off or using sleep mode for computers not in use for two hours or more. Use power strip cords and turn off when not in use.

Water Heater

Set the temperature on water heaters to 120°F, and install an insulating blanket on the water heater (which should pay for itself in less than a year). Consider replacing old units with a high-efficiency water heater with an energy factor of .90 or higher.

Take a shower. In most households, it uses far less hot water than bathing.
Unwanted air infiltration makes your home uncomfortable and increases utility bills. Caulk and seal cracks and holes that allow outside air to infiltrate into your home, or conditioned air to escape from it. Look for signs of air infiltration around walls, ceilings, doors, windows, recessed ceiling lights, plumbing penetrations, and electrical switches and outlets. Use non-expanding foam insulation around doors and windows.

Inspect single-pane and old windows. Boost their efficiency with weather-stripping or replace with energy-efficient models. Select new windows with a U-factor of .30 or lower and with low-emissivity (low-E) coatings. Window coatings save energy, especially on west-facing windows. For most residential applications, low-E coatings are sufficient. They can cut heat gain by up to 25 percent without changing a window’s appearance. Consult with an energy auditor before replacing windows.

Outdoors
Landscape smart. A line of fast-growing trees, like poplars or tall shrubs can serve as a windbreak. Planting evergreen trees on the north side and deciduous trees on the south side of a home can block winter winds and summer sun. Shrubs along the house can help, too, but don’t let them interfere with heat pumps or air conditioners.

Humidity is a factor. To avoid raising the humidity indoors during summer months, take baths or showers and wash dishes early in the morning or in the evening instead of during the day, and use an outside clothesline rather than a dryer. Replace old or worn out bathroom exhaust fans with humidity-sensing units.
Exhibit Six
This calendar is dedicated to the beautiful people and places in Arkansas.

When we began the Arkansas Living calendar photo contest, our mission was to depict the joys of life in our great state. More than 1,100 cooperative members submitted photographs. We deeply appreciate your enthusiastic participation. Your love for Arkansas was evident in the many photos we were privileged to judge.

The winning photographs featured in this calendar truly capture Arkansas people enjoying the every day pleasures of life in The Natural State.

Thank you to the members who participated in our photo contest and helped make this calendar so special.
Make a New Year’s Resolution to be Energy Efficient in 2012.

The Electric Cooperatives of Arkansas are committed to helping our members preserve resources and manage energy costs. Utilize the monthly energy-saving tips in this calendar to help you save energy, live comfortably and save money on your electric bill. Throughout the year, we make it easy for members to keep up-to-date on the latest energy efficiency ideas.

www.SmartEnergyTips.org
Log on for resources to help control energy consumption and costs.

Arkansas Living
Each issue of Arkansas Living magazine contains informative energy efficiency articles.

Arkansas Living E-newsletter
Subscribe to the Arkansas Living e-newsletter and energy efficiency tips will be sent directly to your inbox. Visit www.SmartEnergyTips.org to subscribe.

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Like Arkansas Living magazine on Facebook.

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Follow Arkansas Living magazine on Twitter.

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Subscribe to Arkansas Living magazine’s YouTube channel.

GeoSpring™ Hybrid Electric Water Heater

Hot Technology
Hot Savings

The hot, new GeoSpring™ hybrid water heater.

Hybrid water heater technology helps you SAVE on your second largest household energy expense.

The new industry-exclusive GE GeoSpring™ Hybrid electric water heater is designed to provide the same hot water homeowners are accustomed to, but consumes up to 62% less energy than a standard electric water heater.


Available through your local electric cooperative.

Federal Tax Credits for Energy Efficiency
Tax credits for energy efficiency home improvements are available at 30% of the cost, with no upper limit, through 2016.

✓ Geothermal Heat Pumps
✓ Solar Panels
✓ Solar Water Heaters
✓ Fuel Cells
✓ Small Wind Energy Systems
Give me a hug, Frosty.
**JANUARY Smart Energy Tip**

- Start the New Year off right by saving energy. Consider replacing your old inefficient water heater with a General Electric GeoSpring Hybrid. The GeoSpring is 60 percent more efficient than a standard electric water heater. Also, the GeoSpring is 75 percent more efficient than a natural gas or propane unit. Contact your local electric cooperative for details.

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**Doug Rye Seminar**
- Jonesboro & Paragould

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**Replace Return-Air Filters**
- New Year's Day

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**Change 3 Light Bulbs to CFL’s**
- Martin Luther King Jr.'s Birthday

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**January 2011**

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**www.SmartEnergyTips.org**
Submitted by Dorothy Ann and Randall Parker, members of Clay County Electric

Location: Middlebrook, Arkansas

In the Photo: Danielle and Adza Takhi

Mommy's Little Deer.
Older windows are a major source for heat loss during the winter. Slow
the heat transfer by installing caulking, low expansion foam sealants
and weather-stripping. When considering window replacement, contact
your local electric cooperative for details about energy efficient windows
designed for Arkansas’ climate.

- Replace Return-Air Filters
- Groundhog Day
- Valentine’s Day
- Change 3 Light Bulbs to CFLs
- Presidents Day
- Mardi Gras
- Ash Wednesday
- Washington’s Birthday

www.SmartEnergyTips.org
Wildflowers in bloom brighten an afternoon walk.

Submitted by Suzie and David Mitchell, members of Petit Jean Electric
Location: Dodd Mountain Road — Shirley, Arkansas
In the Photo: Hayden Mitchell with Bella and Lilly
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**March Smart Energy Tips**
- Set the refrigerator temperature to 37°F and freezer temperature to 3°F for optimum efficient energy use.
- Always consider ENERGYSTAR® approved appliances when replacing aged or worn out models. ENERGYSTAR® models use up to 25 percent less energy than their counterparts.

- **February 2012**
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**Replace Return-Air Filters**

**St. Patrick's Day**

**First Day of Spring**

**Daffodil Festival**
- Camden

- Change 3 Light Bulbs to CFLs

- Little Rock Marathon

- Daylight Saving Time Begins – Set Clocks Ahead 1 Hour!
Spring/Summer Energy Efficiency Tips

- Now is the time to tune up your air conditioner for optimal performance.
- Have a reputable insulation contractor inspect your attic insulation. Add enough to reach at least an R-Value of 38-45. Cellulose or open cell foam is recommended.
- Clean under and behind the refrigerator. Dust can build up in those hard-to-reach areas, causing the refrigerator to run less efficiently.
- Close fireplace dampers.
- Before April 15, visit www.EnergyStar.gov for information on tax credits for energy efficient home improvements.
- During the warmer months, heat is always trying to find its way into your nice cool home. Seal the heat by caulking, sealing and weatherstripping doors, windows, plumbing and electrical penetration, cracks and holes. Visit www.SmartEnergyTips.org for more details.

Submitted by Barbara Kmbrough, member of Southwest Arkansas Electric
Location: Stamps, Arkansas
In the Photo: Kayleigh Anne Beaver

A basket, a basket, I filled my flower basket.
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School's out and the fish are biting.

Submitted by Marilyn and Woody Wagner, members of Ouachita Electric
Location: Big Muddy Lake - Camden, Arkansas
In the Photo: Chase Amidan
Home electronics, like computers and TVs, can consume energy even when turned off. Don't forget to unplug all electronics when you go away for the weekend or on vacation.

Plug multiple electronics into a power strip to turn all of them off with the flip of one switch.

Explore more events in SmartEnergyTips.org!
Submitted by: Linda and Leo Kwiatkowski, members of North Arkansas Electric
Location: Bull Shoals Lake - Oakland, Arkansas

in the Photo: Denise and Mike Carden

Extreme tubing on Bull Shoals Lake.
**June Smart Energy Tips**

- **ENERGY STAR**® approved ceiling fans use less energy than their counterparts.
- Turn off ceiling fans when a room is unattended. Ceiling fans merely move air and do not produce cooling. Visit [www.SmartEnergyTips.org](http://www.SmartEnergyTips.org) for more details about ceiling fans.

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*Father’s Day*  
*First Day of Summer*  
*Flag Day*  
*Change 3 Light Bulbs to CFLs*  
*Port Fest Newport*  
*Replace Return-Air Filters*  
*Archev Fest Clinton*  

Submitted by Jolly and Charles Baugh, members of First Electric
Location: Mount Carmel Church — Cabot, Arkansas
In the Photo: Samantha Roedenbeck, Cassandra Baugh and Mikaela Roedenbeck

Celebrating our freedom with family and friends.
### Smart Energy Tips

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<th>Day</th>
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Submitted by Fern and Bill Barentine, members of South Central Arkansas Electric
Location: Self Creek - Daisy, Arkansas

Reel it in, baby!
### August

**Smart Energy Tips**

- When replacing the washer and dryer, consider ENERGYSTAR® models. They use less energy by using less water and the high spin cycle removes more of the water from the clothes and reduces drying time. Also, sensors on the dryer will eliminate unnecessary over-drying.
- About 90 percent of the energy used by a washer is for water heating. Wash only full loads of clothing in cold water whenever possible.

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[www.SmartEnergyTips.org](http://www.SmartEnergyTips.org)
Location: Gosnell High School — Gosnell, Arkansas

Friday night lights, Arkansas style.

Submitted by Michelle and Timmy Blaylock, members of Mississippi County Electric

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- **September Smart Energy Tips**
- Now is the time to tune up your heating system for optimal performance.
- Make sure HVAC contractor inspects the duct work to assure that it's intact, sealed and insulated.
A break from shopping at War Eagle.
### October Smart Energy Tips

- Keep blinds and curtains on south-facing windows open during the day to allow sunlight and warmth to enter your home.
- Close blinds and curtains at night to keep heat inside.
- The days are getting shorter, and your home is requiring more light. So, change out older incandescent light bulbs with high efficiency compact fluorescent or LED lamps.

#### October is National Cooperative Month

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**October 1** - Replace Return-Air Filters

**October 7** - Columbus Day

**October 14** - Arkansas State Fair

**October 21** - War Eagle Mill Craft Fair

**October 28** - Halloween

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**Sunday Monday Tuesday Wednesday Thursday Friday Saturday**

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**2012 Calendar**

**September 2012**

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**November 2012**

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www.SmartEnergyTips.org
Nothing beats a sunset at Petit Jean.

Submitted by Dennis Russell, member of Arkansas Valley Electric
Location: Mather Lodge - Petit Jean State Park
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- Don't open your oven door to take a peek – it lowers the temperature by as much as 25 degrees, increasing cooking time and wasting energy.
- During the colder months, heat is always trying to escape from your nice warm home. Seal in the heat by caulking, sealing and weather-stripping doors, windows, plumbing and electrical penetration, cracks and holes. Visit www.SmartEnergyTips.org for more details.
Who says the family dog can’t be a reindeer?
### Smart Energy Tips

- LED holiday lights are festive, safe and energy efficient. LED lights use 80-90 percent less electricity than incandescent lights and can last up to 10 times longer.
- When considering replacement of an old heating system with a high Heating Seasonal Performance Factor (HSPF) heat pump or geothermal system, contact your local electric cooperative for more details.

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- **Pearl Harbor Remembrance Day**
- **Hanukkah Begins**
- **Hanukkah Ends**
- **First Day of Winter**
- **Christmas Day**

**www.SmartEnergyTips.org**
Electric Cooperatives of Arkansas

We Are Arkansas

1 Cooperative Way
P. O. Box 194208
Little Rock, AR 72219-4208

Arkansas Valley Electric Cooperative Corporation
Ashley-Chicot Electric Cooperative, Incorporated
C & L Electric Cooperative Corporation
Carroll Electric Cooperative Corporation
Clay County Electric Cooperative Corporation
Craighead Electric Cooperative Corporation
Farmers Electric Cooperative Corporation
First Electric Cooperative Corporation
Mississippi County Electric Cooperative, Incorporated
North Arkansas Electric Cooperative, Incorporated
Ouachita Electric Cooperative Corporation
Ozarks Electric Cooperative Corporation
Petit Jean Electric Cooperative Corporation
Rich Mountain Electric Cooperative, Incorporated
South Central Arkansas Electric Cooperative, Incorporated
Southwest Arkansas Electric Cooperative Corporation
Woodruff Electric Cooperative Corporation
Exhibit Seven
Properly Installed Energy Efficiency
Building Components and Measures are the Keys to Saving Energy Costs for Your Home.

Summer heat gain from improperly installed wall and ceiling insulation. Top plate not caulked and sealed.

Summer heat gain from improperly installed folding attic staircase within conditioned air space.

Winter heat loss from improperly installed insulation around electrical outlet.

Winter heat loss from missing insulation around door. Poor door sweep.
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Energy efficiency design concepts should be considered when developing plans for a new home. Some of the more efficient designs maximize floor space while minimizing overall volume and exterior walls. A simple shape will reduce heat gain, heat loss and overall construction costs. Each additional corner and customized ceiling (cathedral, coffered and vaulted) will add to the cost of construction and increase the required BTUs (British Thermal Units) for heating and cooling.

These charts illustrate the additional square feet of sidewall space required when different shapes are designed with the same amount of floor space.

Plan A has 170 linear feet of outside wall and 1,360 square feet of outside wall space.*
Plan B has 180 linear feet of outside wall and 1,440 square feet of outside wall space.*
Plan C has an additional 240 square feet of outside wall space compared to Plan A.

Additional heating and cooling capacity would be required to condition Plan C.*

*Based on 8-foot ceilings.
Construction Standards

When framing exterior walls, the standards shown below are recommended. Past construction methods gave little or no consideration to corner or partition wall insulation. This uninsulated condition may promote the development of moisture within the wall cavity. Also, the uninsulated area does not provide a thermal barrier and promotes heat loss and heat gain. Moisture development occurs when a combination of heat loss, and/or heat gain, and the relative humidity reach certain levels. By its very nature, Arkansas’ moist climate is prone to develop moisture within improperly or non-insulated components or dwellings.

Energy efficiency construction practices enable contractors to insulate these crucial points, use less framing materials and simplify the framing process.

Corner and Tee Construction for Energy Efficiency

Corners and tees are components that can affect the overall insulating performance of an exterior wall. The framing illustration shown is recommended to maximize insulation materials at corners and tees.

Exterior Walls

Either 2 x 6 or 2 x 4 framing can be used in energy efficiency home construction. Your choice of framing materials may affect insulation options and may restrict the ultimate R-value of the wall. A minimum R-13 is recommended.

Cellulose or foam insulation are preferred, and are important components of the ultimate R-value you wish to achieve.

Other elements which can impact the desired R-value are interior finish materials, vapor barriers, exterior sheathing products, and siding.

Headers

Headers for doors and windows located on outside walls should include Styrofoam or other rigid insulation between the two plates. All edges and corners should be caulked and sealed.

Foam Insulated Headers
Complete Home Insulation

Energy is a measurable quantity of heat, work or light. Two laws of thermodynamics science govern the behavior of heat on planet Earth. First, heat energy merely moves from place to place and changes form. Secondly, heat moves from high temperature regions to low temperature regions — never in reverse. So, the purpose of insulation is to slow or impede the transfer of heat from warmer areas to colder areas. During a hot summer day, heat is moving through building materials, windows, doors and air voids as it makes its way into an air-conditioned dwelling. The opposite happens on a cold winter day.

Properly installed insulation will pay for itself by reducing heating and cooling costs. Additional benefits of insulation are a significant reduction of air infiltration, noise reduction, improved comfort and energy conservation.

The three most common forms of insulation used in residential construction are fiberglass, foam and cellulose. At the time of this revision, the Electric Cooperatives of Arkansas recommend the use of properly installed cellulose and foam insulations.

Cellulose and foam insulation not only act as excellent insulating materials, they also perform as air infiltration barriers by adequately sealing cracks and penetrations.

The term “damp-blown” cellulose insulation referenced in this publication is a process application. Regular cellulose insulation is fed through an installation machine upon which a small amount of adhesive and water are added to assure a properly dense-packed installation. Properly installed cellulose insulation dries in a few hours and will not settle over time within the wall cavity.
The industry standard for comparing insulating materials is by the thermal resistance called R-values. R-value refers to a material's resistance to heat flow, not thickness. Note the recommended levels of insulation for Arkansas in this chart published by ENERGY STAR®. The higher the insulation's R-value, the greater the insulating property. Check your local building codes for fire ratings.
Infrared thermal imaging is a indispensable tool in the “home science” field. Thermograms display heat energy as visual images and confirm areas of heat gain or heat loss. Thermograms like the ones shown reveal common problems found in many homes across America. The construction components within this booklet are designed to impede and slow the transfer of heat in residential dwellings.

An infrared camera detects heat nearing 130 degrees. The heat is moving from a hot rooftop through improperly installed fiberglass insulation into an air-conditioned dwelling.

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Temperatures in excess of 112 degrees were recorded inside the dwelling at joints and areas of improperly installed fiberglass insulation. Some areas were noted reaching 120 degrees.

Furred-down ceiling below a shed-style roof. Double layered 6" (improperly installed) fiberglass batts. Temperature recorded on shed roof over 160 degrees. Roof is south-west facing. Room temperature is hot, uncomfortable and has high humidity level.
Ceilings

Ceiling insulation should meet the R-38 minimum requirements. Blown cellulose is recommended and should be approximately 12-14 inches in depth to equal R-38. Many builders in Arkansas are now increasing ceiling insulation to an R-45 level. Make sure to incorporate proper attic ventilation.

Cathedral Ceilings

Conventional construction required cathedral ceilings to have insulation, a vapor barrier and adequate ventilation similar to the illustration. This type of construction enabled convective ventilation to prevent potential moisture development from heat loss during the winter or heat gain during the summer. One must incorporate this method if using fiberglass insulation. As mentioned previously, the Electric Cooperatives of Arkansas do not recommend the use of fiberglass insulation in a retrofit or new home construction... especially on cathedral ceilings.

Home building experts now treat cathedral ceilings like a diagonal wall. Think of an “A-framed” house. It’s nothing other than two walls inverted and used as a roof. Constructed properly, the need for vapor barriers and ventilation is no longer necessary. And thanks to damp-blown cellulose and foam insulation products, the ceiling cavity can be completely filled and eliminate the factors that cause the development of moisture. The “complete-fill” or “cathedralized” insulation method for cathedral ceilings must be installed properly or moisture issues might develop.

Exterior Walls

For exterior walls of conditioned air spaces, insulate to an R-value of 13 or greater. An R-13 value can be obtained with standard 2 x 4 framing construction and proper installation of damp-blown cellulose or foam insulation. Properly installed cellulose or foam may actually increase the minimum R-13 thermal value while dramatically reducing air infiltration.
Floors

Floors over vented crawl spaces or un-conditioned basements should be insulated. A minimum R-value of 19 is recommended. A common misconception is that heat rises. Warm air rises; heat travels in all directions, continually seeking cooler areas. Uninsulated floors become a point of least resistance for heat to travel.

One of the easiest methods for insulating floors over crawl spaces is the application of expanding foam insulation. The product is sprayed against the underside of the floor, joist cavity and stem walls.

Crawl Spaces and Perimeter Walls

Crawl space perimeter walls can be insulated with one to two inches of rigid foam board properly applied to the interior side of the block with adhesive, or with one to two inches of damp spray cellulose. The insulation should not come closer than three inches to the ground for termite inspection purposes. However, at the time of this revision, termite companies are reviewing the continuation of this practice since concrete block, treated bottom plate lumber, properly manufactured cellulose insulation and foam insulation are not considered food sources for termites. Contact your termite company for clarification.

A vapor barrier should also be installed over 100 percent of the ground area. In other words, there should not be any exposed ground within the crawl space. A seamless 6-mil or thicker polyethylene cover is recommended.

Concrete Slab Floors

Concrete slab floors should have a minimum one-inch thick waterproof insulation board between the entire outside edge of the slab and foundation. This should extend vertically at least four inches and 24 inches horizontally under the slab. Basement floors less than two feet below ground level should also be insulated in this manner.
If a basement area is to be used as a living or work area, the interior walls should be framed and insulated to meet a minimum R-value of 13.

Damp blown cellulose or foam insulation should be installed between the studs in a basement wall with the type of finish illustrated. The framing lumber will determine the amount of insulation that may be installed. Unexposed walls, as well as exposed walls, need to be insulated.

*Note: Be sure to insulate the area where the floor joist and sill header meet.*

Rigid foam board insulation is commonly used in work and unfinished areas. It may be glued to the walls or attached to wood studs or furring strips. The extruded polystyrene is preferred over the molded beads type of polystyrene insulation.
**Windows**

Windows are used for many reasons – to allow sunlight and warmth to enter the home, introduce fresh air, view the outdoors, to add beauty and **style to the home and more.** However, the reality is windows generally have low R-values and can be a home's largest source of significant energy loss. In an energy-efficient home, the glass should be kept to 10 percent or less of the total wall area and should never exceed 20 percent.

Windows should be selected according to the following properties, listed from best to worst.

**Frame**
1. Wood or vinyl
2. Metal with a thermal break in frame.
3. Metal without thermal break in frame. *(These are energy wasters.)*

**Glazing**
1. Triple pane with Low-E glass.
2. Triple pane.
3. Double pane with Low-E glass. *(Usually the best value.)*
4. Double pane.

It can be difficult and confusing for homeowners to determine whether energy efficiency and quality features are present in a window. For this reason, we recommend that you look for the National Fenestration Rating Council (NFRC) rating label on the window. This label will enable you to compare the energy efficiency features of different window brands. Also, do not let a window brand name be your only determining factor. Without diagnostic equipment, one of the only ways for consumers to confirm the energy efficiency characteristics of a window is the NFRC label. Most major brand name window manufacturers make less efficient, low-cost windows. Compare NFRC labels to guarantee you are getting an efficient window. Furthermore, always ask to see the NFRC label. If the window does not have the NFRC label, or the salesman cannot provide one, there is a possibility that window may not be energy efficient.

When comparing NFRC labels, look for windows with Low-Emissivity (Low-E) and a U-factor of .35 or lower. Also look for windows with a Solar Heat Gain Coefficient (SHGC) of .30 or lower. The lower the U-factor and SHGC, the more efficient the window will be. Since Arkansas is located in a moist, warm climate, properly insulated and sealed, Low-E, low U-factor and SHGC windows can make a significant reduction in heating and cooling costs. The Low-E reflects the sun's radiant heat during hot summer months. Both Low-E glass and low U-factor windows help reduce heat gain through the glass during summer months and retain heat in the house during winter months. A low SHGC helps block heat generated from the sun.

**SOLAR HEAT GAIN COEFFICIENT**
Depending on Low-E choice, the solar heat gain can be reduced considerably

**U-VALUE (heat loss value)**
All Low-E glass will reduce the amount of heat lost through your windows

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*Electric Cooperatives of Arkansas*
**Doors**

All doors opening to the outside or into an unconditioned area, such as a garage, should be insulated. Insulated metal and fiberglass doors with urethane foam core are recommended. Storm doors can be added but only marginal gain will be realized, with the exception of wood doors. Care should be taken when storm doors are added to metal doors with a western exposure due to excessive solar heat build-up. If French doors are preferred, use those with one side fixed and with a high energy efficiency rating.

![Cross Section of Energy-Efficient Door](image)

**AIR INFILTRATION**

Air infiltration is unwanted and unmanaged air movement that adversely affects home comfort and drives up energy related costs. Numerous studies by residential energy efficiency experts pinpoint air infiltration as the biggest source of energy waste in American homes today. No home is built airtight; however, the movement of air into and out of homes can be reduced, controlled and managed.

Air moves through any unsealed cracks or gaps associated with normal construction. These areas include cracks in framing, under base plates, top plates, around duct registers, through holes for electrical and plumbing services and especially around windows and doors.

Caulking can substantially reduce air infiltration. A high quality brand of silicone acrylic latex caulk is recommended. Properly installed house-wrap may also reduce infiltration. The material is applied on the outside of a framed wall between the wall and siding. It is also an excellent means of sealing around doors and windows. The wrap is not a vapor barrier.

![Caulking and Sealing of Top and Bottom Plates, and Electrical Penetrations](image)
Caulking, foam sealants and house-wraps are very good and relatively inexpensive ways to reduce your heating and cooling bills. They also help you get the most comfort for your energy dollars. Apply caulking from the inside of a framed dwelling prior to the installation of the insulation and sheetrock components.

It is recommended that all electrical, plumbing and outside penetrations into the home be caulked and sealed to prevent outside air infiltration. Since all homes are unique and different, the following is a general list of areas to focus upon. When in doubt, caulk it.

a. All penetrations (wiring, plumbing, etc.) into all wall cavities should be caulked and sealed, including through the top and bottom plates of the wall cavity.

b. Windows and doors should be caulked and sealed with low-expansion foam specifically designed for those applications.

c. Foam should be used between the box sill and foundation or basement wall.

d. Bottom plate should be caulked to the sub floor.

e. All headers should be caulked and sealed into place.

f. House wrap should be installed under siding.

g. Double top plates and studs should be caulked.

A blower door system is a diagnostic tool designed to measure the airtightness of buildings and to help locate unwanted air infiltration.
Air can enter the home through infiltration, opening doors and windows, or from mechanical ventilation. Natural ventilation refers to the entry of air through intentional openings such as doors, windows and vents. Mechanical ventilation is the intentional removal of indoor air or introduction of outdoor air using a fan or blower.

As mentioned previously, it's virtually impossible to create an airtight home. However, some building codes may require mechanical ventilation if a blower-door test reveals 30 (30%) natural air changes per hour or lower. Visit www.ashrae.org for comprehensive details pertaining to ventilation and indoor air quality.

Attic Ventilation

Ventilating attic space to allow warm, moist air to escape is important. With no vapor barrier, at least one square foot of vent opening for each 150 square feet of floor area is necessary. If your vent has 1/8" or 1/4" wire mesh over it, it should be 1 1/4 times as large as the basic size. If it is covered by 1/4" mesh and a louver, it should be twice as large for proper ventilation.

If you have a vapor barrier, there should still be one square foot of free vent opening for every 300 square feet of attic floor. One half of the vents should be located near the roof ridge, and one half of the vents located near the soffit. These vents should be located so that half of the vents are low and half are high.

Inadequate ventilation and insulation or closing attic vents may cause:

- Mildew and wood rot of roof joists
- Condensation in the attic that robs insulation of R-value
- Water stains on interior ceiling
- Frost during winter months

Crawl Space Ventilation

At the time of this revision, there is developing research that indicates a tightly sealed crawl space is far more energy efficient than those with open ventilation. One theory suggests enabling cold outside air into the crawl space during the winter increases winter heating bills. Conversely, the hot air from summer increases cooling bills. In southern climates, allowing hot and cold air into the crawl space may introduce moisture into the home. Also, open crawl spaces may cause condensation on uninsulated ductwork and promote mold growth.
Crawl spaces cannot be tightly sealed if there is constant or recurring moisture from natural springs, water leaks, drainage, or condensation. Building codes may require ventilation, so always be sure to verify with local code enforcement before sealing the crawl space.

If a crawl space must or is required by local code to be ventilated, locate vents as high as possible from ground level and close to the bottom of the joists.

Crawl space vents are typically 16 inches by 8 inches and have a net-free area of 64 square inches. The vents should be spaced far enough apart to provide for effective cross-ventilation.

If a ground cover is provided, one square foot (144 square inches) of net-free vent area for each 1,500 square feet of crawl space is sufficient, but more vents are desirable. Four vents, two each on opposite sides of the house, provide minimum ventilation.

If no ground cover is provided, the vent area should be increased to one square foot (144 square inches) of net-free vent area for every 150 square feet of crawl space.

**Kitchen and Bath Ventilation**

All exhaust fans should be vented to the outside, not the attic, and should be equipped with a back draft damper. Humidity-sensing exhaust fans should be installed in all bathrooms and always vented to outside.

**Radiant Barrier**

Radiant barriers are materials installed in buildings to reduce summer heat gain and winter heat loss. They also reduce heating and cooling energy usage. The potential benefit of attic radiant barriers is primarily in reducing air-conditioning cooling loads in warm or hot climates.

Radiant barrier works by reducing the heat transfer from thermal radiation across the air space between the roof deck and the attic floor, where conventional insulation is usually placed. Radiant barrier roof decking works by reducing the amount of radiant heat on the attic insulation. Since the amount of radiation striking the top of the insulation is less than it would have been without a radiant barrier, the insulation surface temperature is lower and the heat flow through the insulation is reduced.

It's not uncommon during an Arkansas summer for temperatures to reach near 160 degrees on the south facing side of an asphalt-shingled roof. Without radiant barrier roof decking, attic temperatures may approach temperatures near the actual external roof temperature. Installing radiant barrier roof decking can reduce the temperature in the attic up to 50 degrees. The reduction in heat gain is very important if ductwork is located in the attic.
HUMIDITY AND VAPOR BARRIERS

The human body is fairly comfortable with a minimum relative humidity of 20 percent and maximum of 50 percent. An average level of 35 percent to 50 percent is recommended for maximum comfort. Low levels of humidity can cause dry skin, aggravate respiratory ailments, dry out furniture and woodwork, and require higher heating temperatures to satisfy occupants of the house and to control static electricity.

High levels of humidity can impair insulation effectiveness, cause condensation at windows, and cause structural rotting of joists and framing.

As outside temperature drops, the humidity level in the home decreases. Also, a home with low air infiltration may have higher humidity levels.

To increase humidity in your home:
• Install a humidifier.
• Properly install glass doors and damper in fireplace.
• Install tight fitting storm sash around windows and doors.
• Properly install vapor barriers during construction.

To decrease humidity in your home:
• Install an electric air conditioner.
• Install a dehumidifier.
• Install adequate exhaust fans for kitchen, bath and laundry areas.
• Install humidity-sensing exhaust fans in bathrooms.
• Properly ventilate clothes dryer to outside.
• Increase mechanical ventilation.

Homes with one or more of the following conditions are more likely to experience increased humidity levels:
• Less than 800 square feet of living areas.
• Less than 250 square feet per occupant.
• Tight wall or ceiling construction, weather-stripping on windows and doors.
• Heating systems that use outside combustion air.
• Low-sloped roofs or unvented attics.
• Gas ranges, unvented gas stoves and gas logs, other gas-fired appliances.
• Crawl spaces with no ground cover.

Vapor Barriers

A vapor barrier is a material with high resistance to moisture flow. By definition, it should have a rating of 1.0 perms or less.

Using fiberglass insulation may cause excessive moisture in your home. Moisture can filter through insulation, causing it to become damp and matted. Wet insulation loses its effectiveness. A good vapor barrier installed on the inside of exterior walls will protect the insulation from moisture in your home.

Although a vapor barrier will protect insulation, it will also increase the humidity level in your home. With a properly installed vapor barrier, humidity control becomes essential. In most cases, a vapor barrier is not necessary or recommended when cellulose or foam insulation are properly installed in the walls.
Concrete Slab

Apply a 6-mil polyethylene plastic film to the ground area before the slab is poured. Lap material six inches and away from the direction of the concrete pour.

Crawl Spaces

If you are insulating the floor over an unheated crawl space, lay 6-mil polyethylene film on the ground to keep the moisture from moving into the house. Extend the plastic sheet several inches up the walls and fasten. Overlap and anchor adjoining pieces.

BLOWER DOOR TESTING

While following the recommendations in this guide will reduce the amount of air leakage or infiltration, some sources of leakage are extremely difficult to locate. Homes can be tested for leakage with a device called a blower door system. Blower door testing involves depressurizing the home to artificially increase the amount of leakage. Leakage can be readily identified and sealed. The blower door also provides an assessment of the home's overall tightness. A similar process using a duct-blaster is used to test for duct system leakage. Duct leakage has been identified as a serious problem in many areas of the country.
A major decision when building a new home is the type of heating and cooling system to install. Most contractors and homebuilders using electricity as their choice for heating and cooling are selecting heat pumps. Two types of heat pumps available on the market today are geothermal and air source.

Geothermal Heat Pump

The most economical heating and cooling system available today is the geothermal heat pump.

Ground source or geothermal heat pumps use the earth as a giant heat sink. By circulating a water and antifreeze solution through a series of high-density polyethylene pipes buried in the ground, the ground source system uses the earth's constant temperatures as a pre-heating and pre-cooling cycle. The compressor and mechanical equipment provide the balance of heating and cooling required. The result is a system that will deliver from three to five units of warm, comfortable heat for every unit of electricity consumed. The piping loop can be buried in the ground either horizontally or vertically. Lake loops and well water systems are additional ways of installing a loop system.

Geothermal heat pumps can also provide free domestic hot water from a de-superheater feature while in the air conditioning mode. They can also be equipped to provide year-round hot water at a substantially reduced cost compared to a conventional water heater.

**Vertical Loop Ground System**

Typical Vertical Installation
- one loop per ton
- each loop 10-15 feet apart and 150-200 feet in depth

**Horizontal Loop Ground System**

Typical Horizontal Installation
- 500-600 feet of pipe per ton
- 200-300 feet of trench per ton
Air Source Heat Pump

The air source heat pump operates on the same principle as the geothermal heat pump except the air source heat pump extracts heat from the outside air. It provides comfortable and affordable heating and cooling all in one unit. Efficiencies are stated in terms of SEER, Seasonal Energy Efficiency Ratio; and HSPF, Heating Seasonal Performance Factor. Units with a SEER of 13 or greater and HSPF of 8.5 or greater are recommended.

Regardless of the type of heating and cooling system you install, it is critically important to have the unit properly sized for your particular home. Bigger is not better!

Your electric cooperative or a reputable heating, ventilation and air conditioning (HVAC) contractor can assist you in properly sizing your heating and cooling system.

For more information on a variety of heating and cooling systems, contact the member services department at your electric cooperative. Cooperative staff will be happy to provide you with additional information, brochures and a list of local, qualified dealers. They can also provide you with information on operating costs for your area.

Duct System

The duct system must be properly designed and sized to allow adequate and balanced airflow throughout the house and to maximize operating efficiency of the HVAC system.

It is recommended that the duct system not be placed in an unconditioned attic. Extreme fluctuations in temperature have a detrimental effect on the operating equipment. All ducts running through unconditioned areas must be insulated. Use radiant barrier roof decking if installing ductwork in an attic. If possible, the duct system should be located in the conditioned area as a furred-down design, or in a basement, crawl space or slab.

The entire duct system should be constructed of metal and be made airtight with duct mastic and reinforcing tape. Never use general-use duct tape to seal and tape joints. Also, avoid using flex duct. The duct system should also be properly insulated. Special ductwork for slab installation is now available. Contact a reputable HVAC dealer for details.
Fireplaces

Fireplaces generally are not energy efficient; however, many modern homes have them for aesthetics and nostalgia. If you plan to include a fireplace in your home, consider adding more energy efficiency components and measures that will offset the energy loss from the fireplace.

- If possible, install the fireplace on an interior wall to minimize heat loss and heat gain.
- Install an easily closed damper to seal off outside air.
- Install an outside air vent or source for proper combustion.
- Make sure you have airtight glass doors.
- Install a fireplace insert to increase heating efficiency.

[Diagram: Corner Fireplace Framing Within Foam Insulated Envelope]

Fireplace Installation In an Energy-Efficient Dwelling
When purchasing an electric water heater, match the gallon size to the needs of your family. A 50-gallon water heater is normally adequate for an average family.

Consider installing a high energy-efficient Marathon water heater. All units have an energy factor rating of .91 to .95. They come with a lifetime warranty on the tank and are guaranteed to never leak or rust. Another option is the ultra-efficient General Electric GeoSpring Hybrid water heater. At the time of this revision, the GeoSpring was ENERGY STAR® rated with an Energy Factor (EF) of 2.35 or 235% efficiency. The GeoSpring uses heat pump technology and is considered one of the most efficient water heaters available. Contact your local electric cooperative for details about both water heaters.

Check the temperature on your water heater for additional savings. Most water heaters that are set for 120°F can provide adequate hot water for most families.

1. When possible, place your electric water heater on a two-inch thick rigid insulation board to insulate the bottom of the tank.
2. Insulate all hot water lines above and beneath your floor. Insulate hot water lines located in slab before concrete is poured.
3. Locate your water heater in a conditioned area of your house, preferably close to the center of the house.
4. Install heat traps for additional savings.

When shopping for water heaters, always look for the bright yellow energy rating tag. Look for units that have an EF rating of .90 (90% efficiency) or higher. Also, water heaters of .90 or higher generally do not require insulating blankets.

At the time of this revision, the U.S. Department of Energy has proposed higher efficiency standards for water heaters. Proposed increases, if finalized and promulgated, will not take effect until 2015. When building an energy-efficient home or replacing an existing water heater, always strive to install an electric unit with the highest EF possible.
LIGHTING

Lighting requires planning when building a new home. Today's lifestyles and modern technology can make a big difference in the look and convenience of lighting in your home.

Lighting is part of your environment. It affects your mood, color, safety, convenience and decorative quality of your home.

Lighting can help you relax or can keep you awake. Proper planning allows you to control your home environment with lighting. Include in your lighting plan all the functional and decorative lighting you require so the wiring can be installed during construction.

Plan your switch locations properly to allow walking through the house from lighted area to lighted area without having to go back to turn off a light.

Make sure that you have plenty of outlets throughout your home, including your hall and foyer.

Plan your outdoor light controls in easily accessible locations.

Include all the areas where you may need additional lighting, such as the shower, closets, under kitchen cabinets, stairways, etc.

Compact Fluorescent Lighting

A much more energy-efficient lighting option is the compact fluorescent lamp (CFL). CFLs have a little higher initial cost, but use about 70 percent less electricity than incandescent bulbs and last up to 10 times longer. They provide the same quality of light as incandescent and give off less heat. Compact fluorescents use the same principle as standard tube fluorescents, but the tube is smaller and folded over to concentrate the light.

Because of their smaller size, compact fluorescents can be used in table and floor lamps, ceiling fixtures, ceiling fans and candelabras. Compact fluorescents come in three shapes: twin-tube, globe (or cylinder) or spiral. All types need ballasts to operate, devices that alter the electric current flowing through the tube. Many come with ballasts attached, while some require that ballasts be purchased. Dimmable CFLs are also readily available.

Light Emitting Diode

LED (Light Emitting Diode) bulbs can use 20 to 50 times less energy than incandescent bulbs and may last for up to 20 years. At the time of this revision, LED bulbs are available, but are quite expensive. Much like CFLs in their genesis, LED bulbs most likely will become more available and affordable as technological advancements improve and economics affect supply and demand. As your CFLs reach their useful life, replace them with LEDs. Buying them one at a time may fit your budget.

Where applicable, only use recessed light fixtures that are rated insulated contact airtight (ICAT) and can be insulated from above.
Make sure that recessed lights, which are most often located in attics or vaulted ceilings, are not a source of air infiltration. This causes energy loss and leads to moisture damage of ceiling insulation, reducing its effectiveness. Invest in ICAT recessed ceiling lighting fixtures.

Known as ICAT fixtures, these recessed ceiling lights feature aluminum housings that allow them to be completely covered with insulation. They also have gaskets to seal the space between the fixture and ceiling opening. These other features reduce air infiltration, making airtight recessed fixtures the most energy efficient choice for this type of lighting. Airtight recessed lighting fixtures also come in a wide range of styles that can accommodate a variety of lamp types, including CFLs and LEDs.

**Outdoor Lighting**

Outdoor lighting in the form of lamp posts, sidewalk lights, floodlights and accent lights can enhance the beauty of your home and expand your family's opportunities for outdoor activities. More importantly, outdoor lighting provides extra safety and security.

For energy-efficient outdoor lighting, choose CFLs and LEDs designed for outdoor use.

When selecting lamp posts and accent lights, choose those that have a light-sensing control to provide efficient dusk-to-dawn illumination.

For security and safety, locate energy-efficient outdoor lights by all your entries, garage and driveway. Consider using solar-powered decorative lighting where applicable.
Recommended Reading and Helpful Websites:

Residential Energy by John Krigger and Chris Dorsi


www.energystar.gov  www.doe.gov

For more information, contact your local electric cooperative.

Electric Cooperatives of Arkansas
We Are Arkansas
www.SmartEnergyTips.org
Exhibit Eight
Put Electrical Safety at Top of Resolutions List

Protecting your family from electrical shocks, tripping hazards and house fires is easier to do than losing 20 pounds or quitting smoking. So make it New Year's resolution No. 1.

Here are 10 simple ways to keep that resolution from the Energy Education Council:

1. Inspect your outlets. Loose-fitting plugs can surprise someone with a shock or even start a fire. If your wall place is broken, replace it so wires won't be exposed. Also, insert plastic safety caps into unused outlets if your family includes young children.

2. Make peace with plugs. If a plug doesn't comfortably fit into an outlet, don't force it. Try a different plug. And never remove the grounding pin (third prong) so that a three-prong plug can fit into a two-prong outlet.

3. Be careful with cords. They're not designed to last forever. Discard frayed or cracked cords. And move cords out from under carpets or rugs where they endure constant pounding that can rip them or wear them out — exposing you to fire from overheated wires.

4. Pack up extension cords. They're fine for connecting strands of holiday lights together and for helping decorations reach plugs during December. But come Jan. 1, pack them up and store them. Extension cords are designed for temporary use.

5. Watch your wattage. The light bulbs in your lamps and overhead fixtures should match the specifications on those fixtures.

6. Find no fault. Ground-fault circuit interrupters, or GFCIs, are a must in every outlet in the kitchen, bathrooms, laundry, basement, garage and outdoors. If water could touch electricity, you need GFCIs on every outlet in the room.

7. Fuss with your fuses. If you don't know whether your fuses are the right size for the circuit they're protecting, call an electrician.

8. Adjust appliances. If a circuit trips every time you plug in your hair dryer, or if your coffee maker has ever shocked you when you plugged it in, you either have faulty appliances or an overloaded circuit. An electrician can identify and solve your problem.

9. Upgrade the wiring. Faulty electrical wires start many house fires. If you hear popping or sizzling sounds behind the walls or if light switches feel hot, do not use those fixtures or switches until a licensed electrician has replaced them.

10. Get what you need. Unless you live in a brand-new house, you probably are using more electricity than the builder ever dreamed you would. Call an electrician to determine whether your home needs more electrical capacity.

Is Your Electrician a Pro?

Even the handiest of handymen leave electrical work to licensed, professional electricians.

Electricity can be dangerous in a home that's improperly wired, has overloaded circuits or has exposed or defective wiring, receptacles and switches.

Even if the job seems simple, it's better to call an experienced electrician to do it. Most electricians have hours of on-the-job training under the supervision of a more experienced electrician and have passed an exam.

So don't leave your electrical work to your handyman, your brother-in-law or yourself. The money you spend hiring a professional will more than pay off in peace of mind and a safe home.

It's Pretty Easy to Lower Your Heating Bill

You don't have to shiver through the winter or wear your winter coat to bed just to save a few bucks on heating this winter. Here are three simple ways to lower your energy bill and stay comfortable, too:

> Turn off exhaust fans in the kitchen and bathroom as soon as the steam or smell is gone. It takes only one hour for those fans to blow all of the warm air out of your house.

> Close the fireplace damper when you're not burning a fire. An open damper is a hole in your house that sucks heated air out and invites cold winter air in.

> Move furniture and rugs away from heating vents so air can circulate freely. That will make your heating system's work a lot easier.
TIPS TO CUT YOUR UTILITY BILLS

EAST STUDENTS TAKE THE CHALLENGE

About a year ago I was asked by a group of high school students from Star City to make an energy efficiency presentation to them and to citizens in their community. I told them that I would be glad to do that and we set a date. This request seemed very unusual to me because in all the years that I had been teaching about energy efficiency, I had never been asked by students to make such a presentation. And for the students to include the whole community was certainly a first. I wasn’t sure just what to expect, but I knew that I could talk about energy efficiency for as much time as they would allow. I received a call from David McCoy of C & L Electric Cooperative who told me that he would be present to assist as needed. That certainly eased my mind as I figured that he would know just about everyone in attendance.

As I parked my automobile at the community center, I was met by eight super-polite young men and women. I was immediately impressed. As they assisted me in carrying and setting up my teaching displays, they started asking questions and I started teaching. I was enjoying every minute because these young folks really seemed to want to learn about energy efficiency. As we talked, adults from the community began to enter the room. The audience was served a light lunch by the students, and I taught for about 45 minutes. Each time that I would try to end the session, someone would ask another question. Let me just say that it was a great experience.

Well, this was my first introduction to a school program called the EAST Initiative. I think EAST is just wonderful. EAST stands for Environmental and Spatial Technologies. This program teaches that all students have value and deserve the opportunity to demonstrate their value to their school and community. It was after this meeting that I began to think that perhaps we need to spend more time teaching energy efficiency to young folks. We had results from that meeting. Several of the attending adults called me at the office asking me where to get the products, such as cellulose insulation and window tinting, that I had discussed. One of the calls came from the dad of one of the students. The dad had not attended the meeting, but the student told him how to solve an energy problem at their house.

Since that first meeting, I have made a presentation to the statewide EAST faculty members, as requested by Ozarks Electric Cooperative in Fayetteville. I then made a presentation to the EAST students at Lakeside High School in Hot Springs, as requested by First Electric Cooperative. Then it was on to Harrisburg High School as requested by Craighead Electric Cooperative. Two days later, I taught EAST students at Morrilton High School, again at the request of First Electric Cooperative. All of these meetings went well, and I was totally impressed with the behavior and interest of the students.

I knew, however, that the subject of energy efficiency couldn’t possibly be exciting to these young students unless they could see that results came from their efforts. I have seen young folks go on mission trips where they actually performed manual labor to help improve a family’s house. They received great satisfaction from their work and talked about it for weeks. So, I thought, why not teach these students exactly how to make a house more efficient? We had an EAST presentation scheduled for Nov. 15 at the Hillcrest District High School in Lynn. I called my friends Monty Williams and Becky Carter at Craighead Electric Cooperative and asked what they thought about using some of the students to actually demonstrate how to do caulking and other energy improvements. They thought that it was a great idea, and after discussing it with their boss, decided that we could challenge the EAST students to find a suitable house that needed energy improvements. If they did that, we would spend a full day with the students making energy improvements on the house. Well, they accepted the challenge, and I can’t wait to give these fine students some hands-on experience so that they can help others. Of course, you know that I am, as always, challenging you to make your improvements. Call me at the office at 501-653-7931 if you need help or visit www.SmartEnergyTips.org.
AECC Board Elects New Officers

The board of directors of Arkansas Electric Cooperative Corporation (AECC), the wholesale power supplier to Arkansas’ 17 electric distribution cooperatives, elected new officers at the board’s December meeting. They are: Chairman – Mitchell Johnson, president and chief executive officer of Ozarks Electric Cooperative; vice chairman – John Dalton, president of the Clay County Electric Cooperative board, and secretary-treasurer – Mel Coleman, chief executive officer of North Arkansas Electric Cooperative.

What is a Lumen?

A lumen is a way to measure how brightly a light bulb burns. Just as you would buy milk by the gallon and bananas by the pound, we’ll soon be buying light by the lumen.

In fact, new packages of light bulbs already sport a Lighting Facts Label that tells you the bulb’s lumens instead of its watts. That’s going to take some getting used to.

Here are a few guidelines from the Department of Energy:

- The light from a new bulb with 1,600 lumens – whether it’s a CFL, halogen or LED – is about equivalent to a 100-watt incandescent.
- Replace a 75-watt incandescent with a 1,100-lumen bulb.
- Choose a bulb with 800 lumens to take the place of a 60-watt incandescent.
- Look for 450 lumens to shine as brightly as a 40-watt traditional bulb.

The Lighting Facts Label also reveals how much it will cost you to burn the bulb for a year, how long the bulb will last – based on using it three hours a day – whether its light appears warm (yellowish) or cool (whiter) and how much energy it uses (in watts).

Harris Brake to be Reforested

Following the damage left by a devastating tornado last year, work to reforest a portion of the Harris Brake Wildlife Management Area has begun. Shortly after the tornado, the Arkansas Game and Fish Commission hired a contractor to remove the downed timber. That project has been completed.

Following the salvage project, an assessment of the damaged forest area was completed. It is now necessary for the commission to begin the reforestation program of red oak seedlings. Because of the heavy loss of oak trees in the damaged area, the commission will begin planting the area in February and March, depending on the weather. Without the plantings, the area will become a dense sweet gum thicket. This will diminish the forest’s value to wildlife. To help the seedlings establish before the area can be flooded, the commission will leave a portion dry this winter.
Right-Size Your Home’s Heating and Air Conditioning

When it comes to heating and cooling your home, you can get too much of a good thing.

In fact, if you live in an older home and haven’t replaced your heating or air conditioning systems, there’s a good chance that they’re both way too big.

It used to be that homes were so energy inefficient that much of the heated or cooled air would leak right out of the house through windows and through tiny holes and cracks around windows, doors and the roof.

New homes are generally built tighter so that that’s not such a big problem anymore. And even if you live in an older house, chances are you or a prior owner has replaced the single-pane windows with energy-efficient double-pane models, added insulation to the attic and caulked around the windows and doors to prevent heat loss and gain. If that’s the case, the air conditioning or heating system that was installed to compensate for that loss could be up to four times bigger than what you need now.

That’s a problem because a system that’s too big will cycle on too often, which can leave too much humidity in the air and make your house too hot, too cold or too humid.

When you’re ready to replace your oversized, out-of-date systems, choose energy-efficient models. And insist that your service technician correctly size the system for your lifestyle and the efficiency of the house—not on its age or size.
Don’t Fall for “Energy-Saving” Scams

You can cut your heating bill without investing a dime in equipment or materials.

Lots of companies are advertising expensive home improvements that they claim will save you huge sums on your electric bill. But if you read the fine print, you’ll often learn that one product on its own rarely has such power, and that most of them take years — even decades — to deliver the promised savings.

Save your money. It doesn’t have to cost you much — or anything — to stay toasty warm indoors this winter and shave a few bucks from your heating costs. Four examples:

✓ Change your air filter. The filter’s job is to collect dust, pet hair and other particles that live in your home’s air so they can’t get into your furnace and clog it up. But if your filter is covered in particles, air can’t get through either, and your furnace needs air to operate properly. If it can’t operate properly, it will run too often or too long, and it might leave you feeling cold and tempted to crank up the thermostat. So clean or replace your air filter every few months (more often if you live someplace with dusty or dirty outdoor air). Do the same with your air conditioner’s filter in the summer.

✓ Turn on your ceiling fans. Yes, in the winter! Set it to the “winter” or “reverse” setting so the blades create a subtle updraft, which pushes the warm air that naturally rises to the ceiling back down into the room. The fan doesn’t actually warm up the room, but it makes the air feel warmer so you’ll be more comfortable. And that means you won’t reach for the thermostat to crank it up.

✓ Open the blinds. If it’s sunny outside, that natural warmth will radiate into the house through your windows, which means your heating system won’t have to work so hard to keep the house comfortable. Close them up when the sun goes down to keep the cold out.

✓ Get out your caulk gun. A hole or a crack in a wall, window or door sends your cozy, conditioned air right outside — and invites cold outdoor air indoors. Plug them with caulk or weather-stripping.
About an hour before Professor Tom Hunt and I went on the air recently to host our weekly radio program, we were discussing our show preparation for 2012. Of course, our goal is to help as many of you as possible. We have been teaching energy efficiency for more than 25 years and realize that as advancements in “building science” are discovered, there is more to teach and reveal.

We share our knowledge with you in monthly print in this magazine, with a weekly radio broadcast, scheduled seminars and individual phone calls and email responses. However, don’t forget the extensive resource of energy efficiency information that resides on the Electric Cooperatives of Arkansas website: www.SmartEnergyTips.org. Everything Tom and I teach can be found on this website.

Each week, Tom and I receive numerous calls, letters and emails from the radio show listeners and readership of this column. Most are letters of appreciation. However, sometimes we get letters from folks who still have some questions regarding our suggestions. Here is an excerpt of a letter I received from a listener. He said, “I added cellulose insulation in our attic and installed geothermal heating and cooling, and my electric usage went up instead of down. I’m not happy. Please call me.”

There was a time in my distant past that I would have been nervous about returning his call. However, I was anxious to talk to him because I have learned that energy efficiency measures, properly installed, work every time. He was a little surprised that I returned his call so promptly. He made the improvements 11 months ago and had good records of electricity use. I asked him questions for about 10 minutes and didn’t yet have the answer. I asked him if his previous system was a heat pump or electric resistance heat. He answered that the previous system was a propane furnace and no central cooling. Here’s an “ah ha” moment!

I asked him what his monthly propane bill was in the winter months of 2010 and he said about $130 per month. I asked him what his propane bill was so far in the winter of 2011. He said he didn’t have a propane bill anymore. Then he got excited and almost shouted, “Oh wow, now I understand. My electric bill went up $35, but my propane bill went down $130.”

I then suggested that he have a sub meter installed on his geothermal system so that he could know exactly how much electricity the geothermal unit uses each month. He was very appreciative and kept thanking me. This fellow had already solved his problem but just needed a little help to understand it. I think that we now have a fellow who may recommend what he did to improve his house.

Unfortunately, many folks just can’t afford to make energy efficiency improvements. It usually hinges on income challenges. As one caller told me, “I am one of those who has to choose between food, medicine and utility bills every month. I cannot afford all three.” But even in this case, I try to help in some way. I am always humbled that they would call me for help.

So, Tom and I decided that we would not assume that folks already know the answer, and we would always try to keep our teaching as simple to understand as possible. In these next few issues, I will continue to teach and help you understand energy efficiency, from the very basic laws of physics to the application of energy efficiency improvements for your house. I can hardly wait and hope that the information will help you.

P.S. If our radio program is not on a station in your area, you can go to www.1037thebuzz.com and hear the show live at 9:06 a.m. on Saturday mornings. Go to www.SmartEnergyTips.org to listen to previous shows and get lots of other great energy information.
MANUFACTURED SAVINGS

How to boost the energy efficiency of mobile homes

Manufactured homes, sometimes dubbed mobile homes, often log disproportionately higher energy bills than traditional wood-frame or modular homes. But you can take steps to help manage energy costs and increase comfort.

Manufactured homes come in several configurations: singlewide, doublewide and triplewide. Doublewides and triplewides require a crossover duct to provide air flow between the sections—a major culprit in air leaks that contribute significantly to wasted energy.

Manufactured units must also be transported to a site, and movement can disrupt the integrity of the original construction. Also, homes that sit on jack stands or blocks allow air to flow underneath.

There isn’t a magic bullet to lower the energy consumption of a manufactured home. It takes time and hard work to troubleshoot all of the possible causes of energy loss. The most common culprits and ways to remedy them are:

> Belly board problems — In most manufactured homes, the belly board holds the insulation in place under the floor and serves as a vapor barrier. Plumbing that runs under the floor is on the warm side of the insulation to keep it from freezing in winter. However, the belly board can be damaged by animals, deteriorate over time or become torn, allowing the floor insulation to become moisture laden or to simply fall out, exposing ductwork and dramatically increasing energy losses. Often there is also long-term water damage from leaky pipes, toilets and showers that has compromised floor, insulation and belly board integrity. These problems must be addressed prior to basic weatherization. Replacing the belly board and repairing leaky plumbing should be the first thing on your to-do list.

> Air leakage/infiltration — Infiltration of excessive outside air can be a major problem. Specific problems include deteriorated weather stripping; gaps in the "marriage wall"
that joins multiple units making up the home; holes in the ends of ducts; gaps around wall registers and behind washers and dryers; and unsealed backing to the electrical panel. This is a dirty job and will require you to crawl under the home and into the attic looking for gaps. Gaps can be filled with weather stripping and insulation. You should consult your local hardware store for the exact type of insulation needed for the specific area of the home.

> **Crossover ducts** – Sealing the ducts than run under the sections making up your mobile home will result in tremendous energy savings and increased comfort. Crossover ducts are often made of flexible tubing, which makes them prone to collapse and easy for animals to chew or claw into. Crossover ducts made of thin sheet metal can leak heated or cooled air to the great outdoors, which is what happens when ductwork connections are made with duct tape. Repairs are generally easy, using either special duct sealant or metal tape that can be found at most home improvement stores. If you can afford the upgrade, consider replacing a flexible crossover duct with metal ductwork.

> **Lack of insulation** – Insulation levels in walls, floors and ceilings in manufactured homes can be woefully inadequate. If it is easily accessible, adding additional insulation to ceiling and floors will help. However, adding insulation to walls will be a problem without major renovations that are often not cost justified.

> **Uninsulated ductwork** – Ductwork itself may not be wrapped with insulation, allowing heating and cooling losses. Wrapping ductwork will lead to energy savings. You should be able to find insulation specifically made for ductwork at your local hardware store.

> **Single-glazed windows and uninsulated doors** – Most manufactured homes come with single-glazed windows and uninsulated doors. Replacing the windows with double- or triple-glazed windows or adding storm windows will help to make the home more comfortable. An insulated door will also help. However, these solutions can be very expensive. At a minimum, you should add weather stripping to doors and windows. Also, a window film kit is a cheap and easy-to-install upgrade that will help to keep winter winds out of the home.

It may take a couple of weekends and a few hundred dollars, but basic repairs can yield significant savings. Savings of up to 50 percent have been reported in manufactured homes that have been properly sealed and had old electric furnaces replaced with new electric heat pumps. The key is to get out there and start hunting for the savings lurking under and inside your manufactured home.

Brian Sloboda is a program manager specializing in energy efficiency for the Cooperative Research Network, a service of the Arlington, Va.–based National Rural Electric Cooperative Association.
ENERGY STAR®-rated Appliance Rebate is Back

The ENERGY STAR®-rated Appliance Rebate Program is back, the Arkansas Energy Office announced Feb. 20. The rebate period will run through April 30 or until the program funds are depleted.

The rebate criteria are as follows.
> Rebates will be awarded on a first-come, first-served basis until the allocated program funds are depleted. Rebates are mail-in and the customer receives the rebate check.
> Rebates are only available for the replacement of existing units with new qualifying appliances.
> Purchase must be made from a participating Arkansas retail location or through a participating vendor (i.e. licensed plumber). Online purchases are NOT allowed.
> Rebate forms must be completely and accurately filled out and accompanied by proof-of-purchase and documentation from a participating retailer that the replaced unit was hauled away. Customers can also show proof of recycling in lieu of documentation from a participating retailer/vendor that the replaced unit was hauled away.
> Only ENERGY STAR®-rated refrigerators, clothes washers and select hot water heaters at the stated rebate levels below are eligible. Qualifying appliances must be listed on the ENERGY STAR® website.
  » ENERGY STAR® refrigerators – $275
  » ENERGY STAR® clothes washes – $225
  » ENERGY STAR® hot water heaters – $300 for gas condensing, heat pump, gas storage and tankless systems.
> Purchaser must be an Arkansas residential consumer, supplying a home address – no P.O. Boxes. Neither business customers nor business installations are eligible for rebate(s).
> Households (single addresses) are limited to one rebate per appliance category per household.
> Purchase must be made during the rebate offer period.
> Appliances MUST be installed within Arkansas state boundaries.
> Rebate applications must be postmarked (postal mail) or submitted (electronically) within 30 days of purchase.

With the rebate, this is a great time to purchase one of the most energy-efficient water heaters on the market – the General Electric GeoSpring Hybrid water heater. This water heater is ENERGY STAR®-rated and qualifies for a $300 rebate. The GeoSpring is sold by Arkansas’ electric cooperatives. For more information, contact your local electric cooperative.

Keep Lawn Tools High and Dry

If a full-scale garage clean-up is on your spring cleaning list, take the opportunity to create some storage space for your electric lawn tools.

Tossing your leaf blowers and hedge trimmers into a corner of a dirty garage isn’t the best way to keep them operating their best or to help them last longer. Once your garage is clutter-free, consider hanging some mounting boards or nailing a few 2-by-4s to the walls so you can hang your expensive equipment out of harm’s way.

Before you hang your string trimmer and electric saw – or even your low-tech clippers and spades – clean them. Work off stubborn grease with a kitchen scrubbing pad and then use a damp cloth to wipe grass, grease and dirt from your equipment after every use.

A thorough cleaning before your first springtime use will help prevent clogs and mishaps. An inspection will reveal frayed cords or faulty parts.

Dry your tools completely with an absorbent towel before you hang them after each use. Allowing them to air-dry could cause them to rust.

Choose a spot in your garage that won’t get wet – away from spigots, the garage door and any leaks. As an extra precaution, throw a plastic tarp over them to prevent moisture from finding them between uses.
As I mentioned last month, several things have happened to convince me that I should dedicate several articles to the very basics of energy efficiency. I have pondered this a lot and even wake up during the night thinking about it.

I have discussed some of these thoughts with young students, middle-aged adults and some senior adults. They all agree that we need to know more basics about energy efficiency. Just last week, while conducting a meeting at a high school auditorium, I asked the question, “As we know it, all energy comes from where?”

There were 75 people in attendance including students and adults. No one answered the question, so I asked it again. Finally an adult answered, “From the sun.” That is the correct answer, and I, like many of you, had learned that in a science class many years ago. I’m sure that some others thought, after they heard the correct answer, “Oh yeah, I knew that too.” But I am convinced that many in the room did not know that all energy comes from the sun. Wow, that’s a really big statement, so let’s look at some of the ways that the sun relates to the energy usage of our home.

1. If there had been no sun a long time ago, there would be no coal for the generation of electricity today.
2. If there had been no sun in the past, there would be no natural gas for house heating or electricity generation today. This also applies to propane gas.
3. If there were no sun, there would be no wood to help heat a house.
4. If there were no sun, there would be no wind to turn a turbine to generate electricity.
5. If there were no sun, there would be no rain and, therefore, no water in the lake to generate electricity.
6. If there were no sun, biomass would not even be considered as a possible future source for generating electricity.
7. And last, and most obvious, if there were no sun, you could not have any solar generation.

Isn’t it interesting to note that just about all of this has to do with the generation of electricity? Why is this the case? It is because just about everything in the house, except the dog and the furniture, needs electricity. Even a gas furnace and a gas clothes dryer need electric fan motors to operate properly. And a gas cooktop in the kitchen probably uses electricity for the clock and timers. For the last several years, electronic items have been the No. 1 gifts at Christmas, and, yes, all electronics use electricity.

Well, I think that we would all agree that the need for electricity is not going away and that the demand is most likely to increase. With that said, it is imperative that we use electricity wisely. That is exactly why this column is placed in this publication. Your electric co-ops’ mission is to provide you with adequate and affordable electricity. Folks, I am not an employee of any electric co-op, but I know for a fact that they all work hard to fulfill their mission to you, the member, in spite of difficult governmental regulations. Although you and I have no control whatsoever over utility rates, we do have control over usage. Simply put, that is called conservation and energy efficiency. Think with me for a minute. Just look at a tube of caulk. Energy was required to manufacture, package and ship the tube. Let’s say that it took 50 cents to put the tube on the shelf. Now, let’s suppose that 10 cents of the 50 cents was for electricity for the manufacturing. If you pay $2 for the tube and caulk places in your house, you will then save 10 cents per month on your electric bill. The 10 cents of electricity that was used in producing the one tube of caulk would likely save hundreds of dollars of electricity over the life of the house. What if each household in America would use one tube? Wow, that would be huge. What if each household used 10 tubes? That total savings in the generation of electricity would be unbelievable. It is not important that my dollar figures be exactly correct. But it is important that we use energy wisely today to help have adequate affordable energy in the future. We can do our part, and we can make a difference. Of course, without the sun, it wouldn’t even matter.

See you next month when the sun will make the dog-wood trees really beautiful.
Energy Efficiency’s Cutting Edge

It was April 1977 and the nation was once again in the midst of a crisis, this time related to energy as petroleum and utility costs were on the rise. Then President Jimmy Carter called for Americans to conserve energy by sacrificing comfort and conveniences.

Although some Americans resisted the thought of change, the vast percentage of businesses and residents had no option but to begin manipulating the thermostat that controlled their heating and cooling systems. Rising utility bills and other economic factors forced many into an abrupt lifestyle change. And so began the mindset of residential seasonal thermostat fluctuation. As a result, American living rooms became more uncomfortable during the winter and summer seasons.

Although Carter’s plea was a catalyst for early energy conservation, the “laws of unintended consequences” were also being set into motion. Innovators from varying industries who were not satisfied with Carter’s suggestions, rising energy costs and uncomfortable homes became the vanguard for what we know today as residential energy efficiency and building science. Cutting back, doing without and enduring uncomfortable homes became a great motivator for the study of efficiencies rather than doing without or sacrificing comfort.

A basic definition of energy efficiency is: doing as much or more while using less energy. Another definition from a building science perspective is: continuing or improving your present lifestyle by implementing efficient building components, measures and ENERGY STAR appliances. The main benefits from residential energy efficiency are a more comfortable home, lower utility bills, no required thermostat manipulation and resource stewardship, commonly known as conservation.

The Electric Cooperatives of Arkansas were among the energy efficiency and building science forerunners in the late 1970s. Ever mindful of what’s best for the membership, co-op employees received specialized training in the early building sciences field. The purpose was to learn knowledge and skill sets to be shared with their members through education, training, beneficial information and practical services. That investment transformed the Electric Cooperatives of Arkansas into recognized leaders in energy efficiency.

Residential energy auditing has come a long way since the late 1970s. Early home energy audits began with clipboard, flashlight and leak detection smokesticks. Today, many of our cooperatives use the latest blower door and duct-blaster technology. And they are continuing to stay abreast of the latest innovations.

In 2011, 14 cooperative employees earned the Building Performance Institute (BPI) “Building Analyst” credentials. BPI is a nationally acclaimed credentialing program recognized by the United States Department of Energy, utilities and state weatherization entities. And in January, 13 cooperative employees attended a comprehensive certification course for employing infrared thermography for audits of residential buildings and weatherization applications. Each earned the Certified Building Investigators credentials from the Infrared Training Center.

Infrared thermal imaging is one of the latest technologies to impact the building science field. An infrared camera detects heat energy emitted by objects. A properly trained thermographer can accurately and quickly detect problems, such as missing or improperly installed insulation, air infiltration, moisture-laden materials, loss of insulating gas between window panes, electrical hazards and more.

Among the new and emerging technologies on the horizon is application-based software for running diagnostic equipment and compiling reports. Soon, a qualified residential energy auditor will be able to operate blower door and duct-blaster equipment from a tablet computer device and transmit the reports, data and infrared images to your email inbox.

These are exciting times for energy efficiency, and you can rest assured that your local electric co-op is on the cutting edge of the technology, all in the effort to save you money on your electric bills while making your homes and businesses more comfortable.

For more information, visit www.SmartEnergyTips.org.
Co-op Energy Auditors Receive Infrared Thermography Training

Thirteen employees of Arkansas' electric cooperatives recently received certification in the use of infrared thermography to perform energy audits. Each earned the Certified Building Investigations credentials from the Infrared Training Center.

Infrared thermal imaging is a technology that is greatly impacting energy audits. An infrared camera is used to detect heat energy, which allows the auditor to detect problems, such as missing or improperly installed insulation. The employees receiving the certification are: Doug Brandon, Anthony Galloway, David Hannah and David Copeland of First Electric Cooperative; Nick Manatt and Lyndal Hutsell of Clay County Electric Cooperative; Alan Ferguson of Ouachita Electric Cooperative; Aaron Mantooth of Arkansas Valley Electric Cooperative; Dale Smith of Petit Jean Electric Cooperative, and Brian Wise, Brian Ayres, Joey Magnini and Mike Jones of Carroll Electric Cooperative.

Breathe Easier With HEPA Vacuum Cleaner

Vacuum your floors with a vacuum cleaner that uses a HEPA (high-efficiency particulate air) filter, and you could remove 99.97 percent of allergens such as dust, mold spores, pet dander and smoke from carpets.

HEPA filters are especially welcome at homes of people who suffer from asthma or allergies.

If you buy one, look for a serial number and efficiency rating printed on the filter. Don't settle for marketing slogans like "hospital-grade HEPA," or "HEPA like." Look for the numbers.

And ask the sales representative at the store to show you how to change the vacuum cleaner's collection bag so dust and contaminants won't spill out of it when you change it. Ask for instructions for changing the filter as well.

NEW SEASON NEW LOOK

The Ozark Folk Center Craft Village opens its new season on April 3rd with a fresh new look. We're now open Tuesday-Saturday, 10 a.m.-5 p.m. Concerts are at 7 p.m. beginning April 20th.

Visit OzarkFolkCenter.com for a complete listing of workshops, events and concerts. Come see our fresh new look soon!

SEASON EVENTS

APRIL

6-7: Herbal Field Trip & Medicinal Herb Workshop
1: Spring Greens Cooking
13-15: 3rd Annual Sweep In
20-22: Open House – Folk Festival
26-28: 39th Annual Dulcimer Jamboree

MAY

1: Music Roots Concert
5: Heritage Herb Spring Extravaganza
5: Cooking with Honey
8-12: Cutting Edge Week
11-12: Thumbpicking Weekend
13: Mother's Day Buffet at the Skillet Restaurant
15-19 & 22-26: Garden Glory Days
26-28: Memorial Day Celebration
27: Civil War on the Sylamore
Give Your Air Conditioning Some TLC

Once the weather starts to warm up, but before it gets hot outdoors, schedule an appointment with a qualified air conditioning technician to take a look at your cooling system. Chances are, you'll get good news: Your unit is good to go for another summer. But that doesn't mean you're off the hook for looking after it until you call the tech next spring. Between visits:

- Change the filter every month or two, depending on how hot and dusty it gets. A filter that's clogged with allergens and dust won't allow air to circulate freely to the air conditioning system, which will make it work harder, use more energy and cost you more to operate.
- Keep your outdoor air conditioning unit clean. Sweep away plants, fallen branches and debris that fall on top of it and even from the ground around it. Objects that are too close can prevent adequate air flow.
- Vacuum indoor registers and air vents regularly. Heating contractors say simple dust and dirt cause almost half of their service calls.
- Move furniture and drapes away from registers.

Lightning Season is Here

You can protect your home and your electronics from lightning strikes and power surges this spring by adding two pieces of equipment.

Lightning protection, such as rooftop lightning rods, protects your home from bolts of lightning.

Surge protection ensures that your home won't be damaged from electrical surges that enter the home through your electric and telephone lines. A good surge protector also can protect your home from lightning if it strikes nearby power lines or a utility transformer box and travels through the power lines to your home. And whole-house surge protection can cover all of your appliances and electronics instead of the individual ones you plug into a temporary protector.

You need both lightning and surge protection to make sure fierce springtime storms don't damage your home or your expensive electronic equipment.

Save Energy at Work

Your home isn't the only place where you can save energy. The energy choices you make at work can make a big difference, too.

The principle is the same at home and at work: Don't waste electricity.

Here are five simple ways to save energy at work:

1. Clear papers away from the air conditioning vents around your desk or in your office so the air can easily circulate. And if you're able to control the temperature in your work space, keep it comfortable but not so cold you need to wear a sweater in August.
2. Turn off lights when you leave your office or cubicle. Unplug computers and office equipment when you go home for the day; they keep using electricity even when you turn them off if you leave them plugged in.
3. Replace the incandescent light bulbs in your desk lamps with compact fluorescent light bulbs.
4. Close the blinds or curtains near your workspace on sunny days to keep extra heat from wafting through the windows.
5. Choose ENERGY STAR computers, printers and even water coolers when it's time to replace the old ones at work. They use substantially less energy than other models.
Recently, I was driving to St. Louis to conduct seminars. With plenty of windshield-time, I thought about the great opportunity I’ve been given to help folks across this country enjoy more comfortable homes with lower utility bills.

As I looked at hundreds of houses over the six-hour drive, a recurring thought came to my mind. How can building science and energy efficiency become important action items for all Americans? How do we generate the interest or motivation for Americans to build or make their existing homes more energy efficient? That thought never ceases to overwhelm me. What a gigantic, almost unbelievable, opportunity we have.

Notice that I said we, not I. There was a time only about 35 years ago when a handful of energy efficiency pioneers were among the industry vanguard. Over time, nationwide interest in building science and energy efficiency began to grow. The Electric Cooperatives of Arkansas were among the early pioneers following in my footsteps.

And now there are hundreds who have the experience and training to help you test your house and provide you with a list of needed improvements. The local electric co-op that is sponsoring this column will most likely have such a person who can help you. And because you are a co-op member, your co-op wants to help you. It’s one of the cooperatives’ primary purposes.

In last month’s issue, Lesson No. 1 reminded us that all energy as we know it comes from the sun. So, for Lesson No. 2, let’s discuss basic energy as it relates to heat in some form or fashion. The sun is a really big blob of heat. I expect that you already knew that, but let’s look at how that heat affects practically every aspect of our life.

First, I think that it is neat, and not by coincidence, that our earth seems to be the only planet that is just about the right distance from the sun to support life as we know it. If we were much closer to the source of all energy, it might be too hot. And if we were farther away, it might be too cold.

The sun always shines and affects the earth every second of every day. It is estimated that about half of the heat from the sun is absorbed by something on earth. It is not possible for us to list all of the things that absorb and benefit from the sun’s heat, but it is possible to explain how that heat affects our daily lives.

Heat travels three ways — by conduction, convection and radiation. The better that we understand these principles, the better we can understand how a house uses energy. I am going to do my very best to explain these to you with examples that are easy to understand, but remember that the only reason that I am known as the “doctor” of energy efficiency is because my initials are D.R.

According to the Webster dictionary, conduction is the passing of heat from particle to particle. That means that conduction will occur anytime that one substance of a certain temperature touches another substance of a different temperature. Your foot touching a cold floor or stepping into a hot tub of water is conduction. Your hand touching a cold windowpane or a hot pan in the oven is conduction. Generally speaking, conduction does not occur in gases such as air. That would be convection and will be covered in the next issue.

The speed of the conduction can be very fast or very slow. If the water in the shower is 105 degrees, you say, “Aaahhh that feels great.” But if the first blast is 140 degrees, like some motels, you may scream instead. Remember that a good conductor of heat is not a good insulator and vice versa.

Insulation slows the rate of conduction. A rug or a piece of carpet on that cold floor will make that bare foot feel a lot warmer. Heat always moves toward cold, and, in this case, the heat simply does not leave your foot as fast as before. Furthermore, not all conduction is a bad thing. Take for instance an electric water heater. The electric element touches the colder water within the storage tank and heats it by conduction. That is a useful form of conduction. Other useful examples are a coffee maker, a frying pan cooking an egg and a waffle iron. But you didn’t know building science could whet your appetite!

Next month, I’ll describe how conductive heat often changes to convective heat. The springtime warmth provides us many examples. Stay tuned for the next lesson.
Co-op Power:
Reliable, Affordable and Environmentally Responsible

The Electric Cooperatives of Arkansas have three top priorities: to provide you safe, reliable access to electric power; to offer that service as affordably as possible; and to do both of those things in a fiscally and environmentally responsible fashion.

Because Arkansas' electric cooperatives are not-for-profit enterprises — which means your money stays local — we don’t have to worry about distant shareholders. We are well positioned to make any necessary investments for ensuring safe, reliable and affordable electricity. However, fulfilling our commitment to environmental stewardship in a fiscally responsible manner has become more challenging. Today, many environmental laws that were adopted by Congress decades ago are being used by federal agencies and the courts to address issues for which they were never intended.

For example, the federal Clean Air Act is now 40 years old and was last amended in 1990 — more than two decades ago. Much has changed in the intervening years, including technology, our understanding of the environment, and the electric utility industry.

Today, officials with the U.S. Environmental Protection Agency — often under court order — are trying to modify the Clean Air Act to fit new circumstances. Without a doubt, new EPA rules being issued will wind up back in the courts and lengthy litigation will ensue.

Reasonable people can and will disagree over how to find a balance between protecting the environment, guaranteeing a reliable supply of power and keeping electric bills affordable. Under the right circumstances, Congress eventually will have to revisit the Clean Air Act and update it to fit the needs of the 21st century. In the meantime, we will keep you updated on our efforts to encourage lawmakers and regulators to strike the proper balance on these concerns. We also need your help to make co-op members' voices heard. Learn more about our efforts to develop the co-ops' grassroots on page 24.
What a beautiful spring it has been. We did not receive the usual late freeze, and that has allowed for more beautiful blooms on the trees and plants than I can ever remember. And as we learned in the March issue, it was all made possible by the sun. In the April issue, we introduced the three methods of heat transfer and discussed the one method called conduction. Conduction is primarily the heat transfer between solids and/or liquids. If you touch a hot 150-degree pan in the oven with a bare hand or place it in 150-degree water, you understand how fast heat can move from one item to another by conduction. A product that is a good conductor of heat is never a good insulator.

Now, let’s look at convection, another form of heat transfer. According to the dictionary, convection is the transmission of heat by the mass movement of the heated particles in air or gas. In our discussion, I think that air will always be involved. That means that convection occurs anytime that air comes in contact with anything of a different temperature. Keep in mind that heat always moves toward cold, and moisture always moves toward dry. When cold dry air comes in contact with warm humid air, a tremendous amount of energy can be released. This is how thunderstorms are formed.

As in the 150-degree oven that I mentioned above, conduction and convection often occur near the same location. You can put your hand in the 150-degree air for several seconds without any discomfort. Your hand does slowly get warmer by convection, but the moment that you touch something metal that is the same temperature, it is instant pain from conduction. Notice how fast the hot oven air rushes toward you when you open the oven door. Notice how fast your glasses fog over when you get out of your air conditioned automobile and meet the hot, humid outside air. Another example is that you may be able to leave your hand in a 30-degree freezer for several minutes with no problem at all, but the moment that you touch a frozen solid item, your fingers will get cold immediately. Notice that the heat moves to your hand in the oven but it moves from your hand in the freezer.

When you sit close to a window on a 50-degree winter night, your body heat will try to leave you and travel to the window, but you will probably not even know it. But if it is 20 degrees outside, it may feel like a breeze is blowing on your arm. The heat on your bare arm is simply leaving faster at 20 degrees than at 50 degrees. One of the best ways to explain convection is to place a heater on one end of a large empty room and notice how over time it also heats the other end of the room. That is the result of warm air molecules heating the adjacent cooler air molecules until the whole room is heated.

Folks, I could list many examples of heat moving from one location to another, and every one of them would be the result of conduction, convection and/or radiation. You might enjoy making a list of other examples that show how heat moves by conduction or convection. In the next issue, we will discuss radiation and the ways that all three methods of heat transfer relate to energy efficiency in a house. In the meantime, enjoy the beautiful weather.
I am writing this column at 5:45 a.m. as I watch the beautiful sun rise. Yes, the amazing sun. As you may recall, we have discussed previously how all energy comes from the sun and how heat travels by three methods. We have already discussed conduction and convection, and will now discuss what I consider to be the most interesting form of heat transfer of the three, radiation.

Webster's dictionary defines radiation as, "The process in which energy in the form of rays of light, heat, etc., is sent out from atoms and molecules as they undergo internal change." Radiation is the only mechanism of heat transfer that can move energy across empty space. Radiation from the sun travels to earth by the visible spectrum, such as white light, which we can see, and by the invisible spectrum, which we can't see, as in the form of radio waves, microwaves, infrared waves, ultraviolet waves, X-rays, gamma rays and who knows what other waves or rays that might be discovered in the future. This form of heat transfer can actually affect our mood, attitude and happiness.

Suppose that it has been really cold and we haven't seen the sun in days. Suddenly, the sun comes out and we all, including our pets, hurry outside or to a window to absorb the sun's marvelous heat rays. If we live in a northern state, we may dream of heading to the Gulf Coast to bathe in the sun. Of course, those same marvelous rays can ruin that trip and be very painful if we absorb too many of them.

Do you sometimes dream, as I do, about being in a log cabin in the mountains on a snowy day with a big fire burning in a stone fireplace? Can anything be better than backing up to that fire and feeling that heat on your backside? Of course, your front side is cold while the backside may be overheating, so you turn around fairly often. Less I be misunderstood, as much as one might enjoy this event, a wood-burning fireplace is almost never an efficient way to heat one's entire house. I can almost see some of you wanting to argue with me right now, but we will save that for another time. But remember that the wood you are burning is stored energy from the sun, which made rain, warm soil and green leaves possible.

As mentioned before, examples of all three types of heat transfer may be present at the same location. In the fireplace, the fire heats the air [convection], the stone absorbs the radiant rays [radiation], and anything that touches the stone or hot coals gets burned [conduction].

Well, I could write many pages about conduction, convection and radiation. And I would enjoy doing so. But our goal is to help us all better understand how heat transfer relates to energy efficiency and energy usage, which relates to comfort and utility bills, which is what we most care about anyway, right? Probably so, but you must admit that it is neat to be able to better understand anything relating to energy efficiency.

As I have enjoyed writing these three columns, I have thought of so many examples that I want to share with you. And that is exactly what we plan to do in the future columns. But you know, one should not be surprised at so many possibilities since all energy comes from only one really big object, the sun, which I am now watching set in the western sky. See you next month.
Conquering Financial Fears

Fear is a common stumbling block to making sound financial decisions; however, there are simple steps that can open new paths to achieving financial goals, said Laura Connerly, assistant professor for the University of Arkansas System Division of Agriculture.

“All change involves some risk,” she said. “Change means that things will be different and you’ll have to step out into the unknown.”

Connerly said some people are more comfortable with risk than others, but it’s important to realize that “your fear of risk may be slowing you down from achieving your goals.”

“Let go of your excuses for staying where you are,” she said.

Common fears associated with financial management include fear of losing money in investments, concern about arguing over household expenses, and intimidation about knowing enough to make wise decisions, Connerly said.

She lists four steps to put financial fear in its place:

1. Evaluate your risk.
2. Find role models.
3. Gain knowledge.
4. Jump in.

For more information about getting a handle on finances, contact your county extension office or visit www.arnfamilies.org/arkansassave.

Source: Cooperative Extension Service
Rebates and standards transform kitchens and laundry rooms, but are consumers really saving energy?

Does your refrigerator have Wi-Fi or a door with a view? Select dishwashers self-dispense detergent and clean based on the number of dishes. And you might be surprised to hear some ovens double as refrigerators. Leave dinner in the oven in the morning, then send a text message for the oven to switch from cooling to cooking mode.

“When it comes to appliances in the kitchen, things are getting smarter,” says Kevin Dexter, senior vice president of home appliance sales and marketing, Samsung Electronics America. “We’re listening closely to consumers and adding improvements that busy moms want.”

During the 2012 International Consumer Electronics Show, Samsung unveiled several appliance twists, including an LCD refrigerator featuring Wi-Fi with a grocery app and a Flex Duo Oven using a Smart Divider to cut wasted cooking space.

Samsung isn’t alone. Other manufacturers are also looking for twists to make appliances smarter and keep consumers happy.

“At GE Appliances, we’re rapidly expanding our ENERGY STAR offerings because it’s what consumers demand and it’s the right thing to do,” says Rod Barry, director of efficiency and environmental relations. He claims a kitchen equipped with GE’s ecomagination appliances reduces electricity use by 20 percent compared to standard models.

But with so many cooks in the kitchen, not all innovations make energy sense. Appliances use 13 percent of a home’s energy—a hefty chunk. Electric co-ops are evaluating emerging technologies to find the recipe for innovative appliance success.

Setting the Standard

Manufacturers are constantly enhancing appliances to comply with consumer requests and to meet ever-evolving federal efficiency standards. These standards, first enacted in 1987, drive efficiency innovations and are credited with saving more than $300 billion in electric bills over the past quarter-century, according to the American Council for an Energy Efficient Economy.

Current standards set the bar for furnaces, air conditioners, water heaters, refrigerators and freezers, washers, dryers, motors, lamps and other products. In 2011, a U.S. Senate committee considered tightening appliance standards even more, but the bill has not moved forward for a vote.

Most manufacturers also strive to meet a higher bar of excellence—the ENERGY STAR certification. Launched by the U.S.
Environmental Protection Agency in 1992, ENERGY STAR is a voluntary, international standard for rating energy-efficient consumer products. Not only do qualifying appliances carrying the ENERGY STAR logo meet federal standards, they exceed it. ENERGY STAR-rated appliances use 10 percent to 50 percent less energy and water than standard models.

**Rebate Revolution**

After an influx of appliance rebate funds – almost $300 million – from the American Recovery and Reinvestment Act of 2009, many consumers bought efficient appliances in 2010 and 2011. Although rebates were also offered for HVAC systems and water heaters, kitchen and laundry workhorses were the clear favorites, garnering 88 percent of all redeemed rebates. About 586,000 consumers added refrigerators, 551,000 added clothes washers, and 297,600 dishwashers were updated.

The U.S. Department of Energy (DOE) estimates this influx of efficient appliances will save $48 million in energy costs annually. But these savings are only realized when consumers follow the adage, "Out with the old, in with the new." Unfortunately, a national electric cooperative survey shows that isn't always the case.

"A lot of folks buy these great new ENERGY STAR refrigerators, then put the old 'energy hog' model in the basement as a soda fridge for the kids," comments Brian Sloboda, a program manager for the Cooperative Research Network (CRN), a division of the National Rural Electric Cooperative Association that monitors, evaluates and applies technologies to help electric cooperatives control costs, increase productivity and enhance service to their members. "As a result, a lot of potential savings are lost. Sure, it's convenient to have the extra space, but these folks are paying significantly more just to have cold drinks handy."

CRN partnered with E-Source, a Colorado-based efficiency group, to conduct a national survey of appliances. The study found 19 percent of American homes plug in two refrigerators, and 40 percent of households run a stand-alone freezer, adding expensive cold storage to electric bills.

Older models drain energy dollars. A refrigerator from the 1970s costs $200 more to operate every year than a current model; a 1980s fridge isn't much better, wasting $100 in energy dollars annually.

**Shop for savings**

Consumers should look beyond fancy bells and whistles and research appliances to guarantee energy savings, according to the Federal Trade Commission (FTC). The agency enforces mandatory EnergyGuide labels to help consumers compare brands and shop effectively.

"Most of the differences are on the inside – in the motors, compressors, pumps, valves, gaskets and seals, or in electronic sensors that make appliances 'smarter,'" warns the FTC. "Even if two models look the same from the outside, less-obvious inside features can mean a big difference in monthly utility bills."

EnergyGuide labels offer energy use and efficiency results from independent laboratory tests; the labels are required for refrigerators, freezers, dishwashers, clothes washers, televisions, water heaters and select HVAC systems. To learn more about the impact efficient appliances can have on electric bills, visit www.TogetherWeSave.com.


Megan McKay-Noe, CCC, writes on consumer and cooperative affairs for the National Rural Electric Cooperative Association, the Arlington, Va.-based service organization for the nation's 900-plus consumer-owned, not-for-profit electric cooperatives.
TIPS TO CUT YOUR UTILITY BILLS

COOLING OFF THE ATTIC

Based on the comments that I have received from some of our readers, you have enjoyed the last few columns about energy origination and the ways that heat travels from one location to another. I have included some of these same principles in my energy efficiency presentations, and they have also been well received. So, once again remember that all energy comes from the sun, heat always moves toward cold and moisture always moves toward dry. In the next few issues, we will discuss how these principles affect the comfort and utility bills of your house. More importantly, we will give solutions.

Since July is usually pretty cotton-picking hot, I thought that we would start with the hottest location in the house, which would be the attic. In my seminars, I often ask, "Where is the hottest place in America on a hot summer day?" Someone may answer, "Death Valley, California." Well that is a good answer, but many attics are hotter. I then ask them, "Where is the one location that you would not want to put the AC cooling unit or ductwork?" It usually gets really quiet at this time. Someone finally answers, "In the attic." Well, let me ask you how you would like to sit in your attic on a hot summer day and try to make homemade ice cream? We would probably keep over before the ice cream was ready. It is now obvious to you that the attic may not be a good place for the AC cooling system. It may also now be obvious to you that a substantial part of your heating and cooling bill is related to the location of the heating and cooling system. So why is the AC unit and ductwork still located in the attic on most of the new houses built in the South? It is mostly because it is more convenient and no one has demanded change.

Studies have shown that ductwork located in attics and ductwork leakage in the attic may be the single biggest waster of residential energy in the South. It is absolutely unbelievable how much energy could be saved if folks sealed the ductwork and made the attic cooler.

Using our energy principles, how did the attic get so hot, and what are the solutions? Of course it all started at the sun’s radiant heat. The heat rays left the sun, traveled through space and headed straight toward earth. Some of the rays were absorbed or reflected by the atmosphere and clouds. And some were absorbed into the earth, trees and water, etc. Many of the rays hit the roofs and gable ends of houses. The roofing can get super hot really fast. The hot roof becomes a heat radiator and heats the attic by radiation and convection. All adjacent materials such as insulation, ductwork and framing materials absorb the heat and get hotter and hotter until the rays of the sun are reduced in some way. Much of the heat is absorbed by the insulation, keeping it from reaching the cooler living space, which is good.

Possible solutions to make your attic cooler:

1. If the ductwork is in the attic, the best answer, in most cases, is to spray the entire sloped roof decking and gables with foam, which encapsulates the entire attic space. By doing this, there is no longer an attic at all. It is now just an odd shaped room upstairs and the ductwork is now inside the conditioned space. In this case, the ductwork leakage does not matter as much because it is inside the house anyway.

2. If the ductwork is in the attic but costs prevent you from doing the No. 1 solution, you can do what many others have done in the past: make sure that the ductwork leaks are sealed and add insulation [my preference is cellulose] until you have a total insulation depth of about 13 inches. If possible, cover the ductwork with insulation.

3. Another solution, that you may do yourself, is to properly install a radiant barrier on the bottom or between the sloped roof rafters. This can lower the attic temperature by 20 to 30 degrees on a summer day. Installing or rolling out radiant barrier on top of your existing insulation is not a proper installation method. Doing so will render a negative effect.

4. If your ductwork is not in the attic, you may only need to add cellulose insulation.

Yep, at least one of these solutions will be the answer for you when it is so cotton-picking hot. Call me at the office if you have questions.
Bigger Bills, Because of the Box

Do you have a satellite or cable box around your TV with recording capabilities, often called a DVR? Chances are, you do. With 160 million of these so-called “set-top boxes” in the United States, there is roughly one box for every two people in America, and this number is growing.

These boxes are generally running 24 hours a day, even when not in use. They are massive energy hogs that can use as much electricity as your refrigerator. A recent study by the National Resources Defense Council found that these boxes use roughly $3 billion in electricity per year. Most of this electricity is not put to use watching or recording any television. Currently, manufacturers have little incentive to develop set-top boxes that are more energy efficient. However, the EPA ENERGY STAR standards are beginning to tighten up, and by 2013, there will be new standards that will mandate that these boxes be more energy efficient in order to receive an ENERGY STAR label. Cisco Systems, one of the largest makers, now offers a fanless DVR box to help meet energy efficiency regulations.

Until these efficient boxes are more widely available, consider unplugging your box when going away for a few days. Also, it may be wise to reconsider the need for multiple recording set-up boxes in the house.

Do you really need three Tivos?

Source: Touchstone Energy

Horse Auction

If you are interested in buying a horse, saddle up and head for the Saline County Fairgrounds on Sept. 15. The Arkansas Department of Correction Agriculture Division will hold its second horse auction. The public will have the opportunity to bid on 25-30 retired horses from the ADC’s working herd. Those interested in bidding on the animals may view and ride them from 9 a.m. until noon, and the sale will begin at 1 p.m. on Sept. 15. These horses — some of whose lineage can be traced to the legendary sire Joe Hancock — are perfect for pleasure and trail riding. ADC has crossed quarter horses and draft horses through the years to develop the current working herd.

LATE SUMMER FUN IN THE OZARKS

The Ozark Folk Center is a great place for your whole family to experience the crafts, music and herbs of the Ozarks. The Craft Village is open Tuesday-Saturday from 10 a.m. to 5 p.m. Concerts are at 7 p.m., Wednesday-Saturday. Check out the down-home good cooking at the Skillet Restaurant and stay in our comfortable Cabins at Dry Creek.

SEASON EVENTS

AUGUST

1-3: Labor Day Weekend — Hands-on in the Park
7-9: Folk Dance Days
14-15: Arkansas State Fiddle Championship
21: Cowboy Gathering/Celebrity Concert: The Charlie Daniels Band
22: Cowboy Gathering/Celebrity Concert: Don Edwards

SEPTEMBER

1: Tribute to Grandpa Jones/Celebrity Concert: Michael Martin Murphey
1-3: Labor Day Weekend — Hands-on in the Park
7-9: Folk Dance Days
14-15: Arkansas State Fiddle Championship
21: Cowboy Gathering/Celebrity Concert: The Charlie Daniels Band
22: Cowboy Gathering/Celebrity Concert: Don Edwards

Information: 870-269-3851 • Cabin Reservations: 800-264-3655 • OzarkFolkCenter.com
Doug Rye Says...

**TIPS TO CUT YOUR UTILITY BILLS**

**THE ATTIC IS STILL HOT**

Publication schedules require that I submit this article almost 30 days before it reaches your mailbox. I decide what I am going to write about and how I can best help you by the number of calls that I get that relate to a particular subject and by what I think the situation will be like in 30 days. I wrote the July, "Cooling Off the Attic" column on the first week of June because I knew that attics would start getting really hot in July. I had no idea that we would have record high temperatures all across the state in the month of June and now in July. If we have record weather temperatures, I can assure you that we also have record temperatures in the attics.

I have received a greater response from the July column than from any other column that I have ever written. Even as I am now writing this column for the August issue, I am still getting calls about the July column. Let me make this clear to you. I am not complaining but am honored to have had the opportunity to help so many of you solve your energy-related problems. I am tempted to just suggest that you just go back and read the column again, but I want to teach you even more improvements that relate to an attic.

Remember that the attic may be super hot now, but it may be super cold in four or five months. Either way can affect your comfort and utility bills.

When a house has an attic access hole, an attic pull-down stairway or a whole house attic fan located in the conditioned area of the house, it is almost always a major energy waster. Since heat always moves toward cold, the heat in the house tries to go to the attic in the winter and the heat in the attic tries to go into the house in the summer through any spot that is not insulated or air tight.

An infrared photo of a pull-down attic staircase on a hot summer day reveals a lot. It shows that the staircase ranges from 90 to 103 degrees Fahrenheit. It's trying to heat your house on a summer day, and it's trying to cool your house on a winter day. Solution: Install an insulated cover over opening. Go to www.AtticTent.com for a good solution.

Whole house fan louvers are just as bad as the pull-down staircases, and the house thermostat is usually located right under the louvers. The poor thermostat doesn't know what to do.

The best solution is to simply disconnect the fan, remove the entire assembly and replace with a finished ceiling. Then cover the entire area with insulation. However, if you wish to retain the unit for future use, call me at the office and I will give you the information for a really good solution.

For an attic access hole, weatherstrip the opening and glue rigid foam insulation to the back of the access panel. You see, it really isn't that difficult to solve another energy problem at your house if you just know what to do. See you in September.
Efficiency standards strengthened for clothes washers, dishwashers

Clothes and dirty laundry may not cost as much in a few years, thanks to increased federal energy efficiency standards.

On average, clothes washers and dishwashers are responsible for 3 percent of a home's electric bill and 20 percent of a home's indoor water use. In May, the U.S. Department of Energy (DOE) boosted the minimum energy efficiency requirements for the appliances. The improvements are expected to save consumers $20 billion in energy and water costs through 2030.

Returns on rinse cycles

Thanks to the tougher standards, each household could save up to $350 in energy costs over the life of a new clothes washer compared to today's models, according to the DOE.

When the DOE formed these new standards, consumer choice was an important concern, so different styles of clothes washers were considered and standards set to accommodate each. Front-loading washers must use 15 percent less energy and 35 percent less water, while top-loading models must cut energy use by 33 percent and drop water consumption by 19 percent.

Energy efficiency experts peg water savings to be 10,000 gallons – or 250 baths – for every household, every year, under the new standards.

The changes take effect with 2015 models. This is the fourth time clothes washer standards have been strengthened over the past 25 years.

Dishes don't drain as much

Cleaning dishes drains energy and water; new dishwashers will use 15 percent less energy and more than 20 percent less water – saving about $100 over the lifetime of the appliance, according to experts.
Improved dishwasher standards kick in next year, marking the third time dishwasher standards have been raised since 1987.

Set standards to save

Energy efficiency standards cover a wide range of appliances, from refrigerators and air conditioners, to microwaves and other electrical equipment. Standards for more than 40 products are being strengthened with the promise to cut $350 billion from electric bills through 2030. According to the DOE's Building Technologies Program, consumers and businesses already save $15 billion every year as a result of federal energy efficiency standards, they expect the annual amount to double by 2025.

National standards not only help consumers save on electric bills, but manufac-
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Lee & Berthella Thomas
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MAKEOVER
Palestine Couple Wins Energy Efficiency Makeover Contest

When Lee Thomas of Palestine saw a stream of cars heading toward his house on Aug. 7, he figured he and his wife, Berthella, might have won more than a water heater in the 2012 Energy Efficiency Makeover Contest.

"I thought, all these people coming up here for a hot water tank?" Lee said in an interview after he learned that the couple had indeed won the grand prize – an extensive energy efficiency makeover valued at up to $50,000 – and not the smaller, yet valuable, prize of a General Electric GeoSpring Hybrid water heater given to the semi-finalists in the contest.

Lee discovered he was right when Bret Curry, manager of residential energy marketing for the Electric Cooperatives of Arkansas, emerged from a van carrying a large ceremonial check, which he then presented to the Thomases.

"Today you are being recognized as the winners of the 2012 electric cooperative energy efficiency home makeover," said Curry, flanked by cooperative staff, media and other makeover supporters.

In an effort to make the announcement a surprise, the Thomases, who are members of Woodruff Electric Cooperative, had been informed that they were finalists and would at least receive the water heater.

Still, despite having an inkling they might have won the grand prize, Lee and Berthella were clearly amazed when it was confirmed.

"This is like it is not real," Lee said, while Berthella added that she was "excited, overjoyed and nervous."

The Thomas family's 1,800-square-foot home has higher-than-normal levels of air infiltration.

Time to apply

Berthella said she learned about the makeover by reading Arkansas Living, the magazine for the state's electric co-op members. She missed the contest deadline last year, but pushed her husband hard to apply this year.

"I said, 'Come on now, we've got to get this together, and finally he filled it out," Berthella said, adding that she was interested in the makeover because the home's windows allow air to infiltrate to the point that the curtains sometimes move. Also, a room addition to the home is difficult to heat and cool, the couple said.

"We really couldn't afford any windows right now," she said. "We decided we could apply for this and see what happens."

Fortunately, they did decide to apply and did so with three days to spare before the July 15 deadline.

Cooperatives support energy efficiency

The Electric Cooperatives of Arkansas have long promoted energy efficiency, and the Energy Efficiency Makeover Contest is a major part of that effort. Although only one home could win the grand prize, the project is designed to have a much broader impact. By documenting the process of the makeover via the Internet, Arkansas Living and other media outlets, the cooperatives can help educate Arkansans statewide about how to make their homes and businesses more energy efficient.

To be eligible for the contest, applicants had to be members in good standing.
the homes, and a committee then reviewed reports from the site visits and selected the winner.

The initial audit
When Curry performed a comprehensive energy audit on the home, it was clear that it was energy inefficient. Built in the early 1950s, the 1,800-square-foot single-story home has higher-than-normal levels of air infiltration. As part of the energy audit, Curry performed a blower door test, which removes air from a house using a large fan placed inside a door facing. By removing the air, negative pressure is placed on the house. When air from the outside begins to filter in to replace the air that is removed, the areas where air infiltration is occurring can be determined. Curry then used an infrared thermal imaging camera to spot the areas of air infiltration.

The test revealed that the home measured a rate of nearly 70 percent natural air exchanges per hour. This means that 70 percent of the air within the home exchang-
By the time that you read this, I think that the hot and dry record-setting summer of 2012 will be over. My, my, my, it was a tough one. And just about all of us have felt the pain when we received perhaps the highest summer utility bills ever. Yes, that includes the Doug Rye household.

However, just as you would expect, our utility bills were reasonable because our house was built using the energy efficiency methods that the electric cooperatives and I teach.

Because the summer was so hot, I am still receiving lots of calls about hot attics. So, for the first time ever, I am devoting a third consecutive column to that subject. I will use examples of the callers' questions and my responses to those questions in the hope that it will answer your questions. In almost every hot attic conversation, we talk about insulation. As you probably already know, we need always recommend either cellulose or foam insulation. The best solution determines which one to use. We feel that cellulose is the "greenest" insulation of the two and is usually lower in price. However, in many cases, foam is easier to install and can be the best answer to the problem. Almost everyone asks about the foam, so let me give you a short history of it.

As best as I can determine, a German chemist named Otto Bayer invented a type of foam in the late 1930s. It was then introduced in the United States in the 1940s and used primarily for military and aviation purposes. When the idea of super-insulated houses was introduced in the 1970s, the interest in foam increased and several different types came to the marketplace. One type contained formaldehyde and had a problem of shrinking, which led to the banning of that particular product. It seemed to me that the interest in foam insulation really dropped off for a couple of years and then re-emerged rather rapidly in the 1980s. It was about this time that I started teaching folks about energy efficiency, and common sense told me that ductwork in a hot or cold attic was a major energy problem. But if no crawlspace or basement was available, an alternate location was resisted by the building industry.

I was driving through Mountain Home on a hot summer day and noticed a steel-framed building under construction. The sign said that it was to be a new food center. I noticed that the rolled insulation was being installed on the walls and on the sloped roof. I remember thinking, "Wow, that building won't even have an attic. There will just be a flat ceiling installed to look nice and to contain the light fixtures." It was at that time that I started telling folks at seminars, "Write it down and date it. Doug Rye said that we would see the day when houses didn't even have attics." Many houses have now been built with no attic.

Let me give you three examples of calls from folks concerned about their hot attics. Rita called from Oklahoma. I always ask these questions about the house: Where is it located? What is the house size? How big is the attic? How much and what type of ceiling insulation is there now? Where is the ductwork located? How much was your last electric bill? And why are you concerned about the temperature of the attic?

Rita told me that she lived in Enid, Okla., had a 1,200-square-foot one-story house with the ductwork located in the attic and six inches of batt insulation. She told me that her last electric bill was about $180 and she had floored most of the attic, which she used for storage. Well, this was an easy one to answer. Rita should hire a qualified foam contractor to spray about six inches of foam on the entire attic roof deck and gable ends. In other words,
totally encapsulate the attic, which includes eliminating all attic ventilation. By doing this one thing, it would solve several problems. The ductwork, which includes the leakage, is now in the conditioned space of the house. The storage space is now comfortable. There is more insulation and the utility bills will be lower. You see, what used to be an attic is now just an odd-shaped room above the ceiling.

Bill called from Kansas City, Mo. He has a 2,000-square-foot house with a full basement. The ductwork is in the basement. The attic contains about eight inches of blown insulation. His last electric bill was $157. Again, the answer is simple. Bill needs to add about five inches of blown cellulose over his existing insulation.

When the idea of super-insulated houses was introduced in the 1970s, the interest in foam increased and several different types came to the marketplace.

My favorite type of call is like the one from Albert, who has retired in Bella Vista. His one-story 1,400-square-foot house has ductwork in the sealed crawlspace, 13 inches of blown cellulose insulation in the attic, and his last electric bill was $83. Again, it was a simple solution. I asked Albert if he had any hobbies. He said that he played golf. I told him to go play golf and quit worrying about energy efficiency. We both got a laugh by talking. Folks, these solutions are also the answers for a cold attic.

P.S. Congratulations to Lee and Berthella Thomas, the grand-prize winners of the 2012 Energy Efficiency Makeover Contest. Go to www.SmartEnergyTips.org to watch the cooperatives make the energy improvements to the Thomas’ house, including foaming the existing attic.
Two different advocacy groups are systematically trying to rid our nation of reliable and affordable electricity generation: the Sierra Club, which wants the United States to shut down all of its coal-fired power plants and stop drilling for natural gas, and the Nuclear Policy Research Group, which warns that the United States should shut down all nuclear plants. The battle cry for the Sierra Club's "Beyond Coal" campaign is "124 coal plants down, 398 to go!" The group claims victory for "successfully stopping over 150 coal plants to date" from being constructed and are working to "create the citizen movement that will shut down coal and create a clean energy future." With respect to natural gas, the Sierra Club's slogan is "Dirty, Dangerous, and Run Amok." The group's president, Robin Mann, states, "Fossil fuels have no part in America's energy future — coal, oil and natural gas are literally poisoning us."

And to kill off the third and last fuel that can be used to provide 24-7, base-load electricity — nuclear energy — a physician named Dr. Helen Caldicott has established the "Beyond Nuclear" movement and travels around the globe warning people of the hazards of the nuclear age. She believes that all nuclear power plants and nuclear technologies should be abandoned. The "Beyond Nuclear" movement includes anti-nuclear activists, professors and peace consultants. They have also enlisted several stars in the entertainment industry to help them with their "no nuclear" campaign — famous actors and talent such as Ed Asner, Christie Brinkley, John McEnroe, Bonnie Raitt and Susan Sarandon. These folks may be good actors and tennis players, but I must question their knowledge of electricity production.

Both of these "Beyond Real Fuels" campaigns are premised on the contention that we can fuel a nation of 300 million people and the most productive economy of the world solely on wind, solar and energy efficiency. This completely non-factual and electrically impossible proposition makes me wonder: How did we, the United States, the most envied and successful nation in the world, get HERE? How did we get to the point of debating and having to defend the continued use of the ONLY fuels that can produce base-load electricity — coal, natural gas and nuclear? And, moreover, why would the most prosperous and advanced nation in the world be debating, and in some places seriously arguing about, obtaining permission to use domestically available fuels that allow us to be energy independent?

Once upon a time, we were an America that proudly focused on growing our economy and increasing the quality of life for all citizens. We considered ourselves blessed to have an abundance of domestically produced energy sources that could fuel our engines, our factories, our businesses and our homes. The United States still has an abundance of oil, coal, natural gas and uranium reserves. We have at least a 250-year supply of coal, a potential 100-year supply of natural gas and the fourth largest supply of uranium (nuclear fuel) in the world. Why would we NOT utilize our own energy reserves that are proven, reliable and cost-effective to power our own homes and businesses?

As much as it might sound cool and modern and "techy" to be able to run all of our electric appliances, motors, manufacturing plants, cars and devices solely with wind power, solar energy or energy efficiency, that is not the reality of the world in which we live. Moreover, it's not likely going to be the state of the future any time soon. Renewable sources of energy like wind and solar are intermittent. They are not fuels that can generate electricity at a guaranteed level during every minute and every hour of the day. Simply put, they cannot produce either the constancy or the quantity of electric energy that fuels our homes and our nation's economy. And energy efficiency is not a fuel. Efficiency is an important resource management tool to help us produce the greatest degree of lifestyle comfort and energy with the least amount of fuel. But with a growing number of new electronic devices that will increase our net use of electricity, and with an economy and population that continues to grow, we will always need new sources of fuel — be it coal, natural gas or nuclear — that will produce real electricity.

The Electric Cooperatives of Arkansas are here to "keep the lights on," day and night, at an affordable cost. And in order to do that, we need coal, natural gas, cost-effective renewables and, maybe one day, nuclear power. We need an "all of the above" energy strategy in Arkansas and in our country. We may need to call on you, our members, over the coming months and years to help us remind our public officials that you expect the lights to come on and your farms and businesses to have power whenever you need it. We live and work in a REAL world, not a fantasy world. And it's our job to help power your world with the most reliable electricity at the lowest cost.
Connecting Arkansas

The Joint Committee on Advanced Communications and Information Technology met at the Electric Cooperatives of Arkansas’ headquarters in Little Rock on Sept. 10. The committee meeting took place prior to a meeting of the board of directors of Connect Arkansas. Connect Arkansas, a project of the Arkansas Capital Corp., was formed to prepare the people and businesses of Arkansas to secure economic, educational, health and social benefits via broadband use, and to facilitate the availability of broadband service to every home and business in Arkansas.

“The focus of the meeting was to analyze and fine-tune a draft document of the first Arkansas Broadband Plan,” said Kirkley Thomas, manager of community and economic development for the Electric Cooperatives of Arkansas. “We must, as a state, remove any barriers to broadband, or high-speed Internet services, if we hope to prosper in education, health care and the ability to attract and retain jobs.” Thomas serves on the board of Connect Arkansas and was instrumental in coordinating the meeting.

Save Energy by Planting Trees Near Your House

Take advantage of the fall planting season to make your home more energy efficient.

The tricks: Plant leafy trees on the south and west sides of your house to keep the summer sun from pouring heat through the windows. After they drop their leaves in the fall, they will allow warm winter sunlight to enter the house and give your heating system a break.

Likewise, plant a few evergreens along the north, west and east sides of the house to break the winter wind and keep the cold air from infiltrating your home.

Carefully positioned trees can cut up to 25 percent from your heating and cooling bills, notes the U.S. Department of Energy. If you live in a particularly windy area, a windbreak can ease your fuel consumption by up to 40 percent.

A bonus: Trees near the home can cut down on noise inside the house.

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Yippee. It is fall, school is in full swing, football is being played, the leaves are changing to beautiful colors and attics are no longer super-hot. And, yes, the utility bills will be lower because little, if any, heating or cooling is needed in October.

If you want to know about what it cost to cool your house on one of those hot summer months like August, simply subtract a low fall bill like October's from the August bill. For example: August $275 minus October $165 = $110 for August cooling. This is just an estimate but works fairly well for most houses because the lowest usage in the fall or the lowest usage in the spring is the amount that we consider the base usage of the house. Additional usage would usually be related to heating or cooling.

It is amazing to me that we are still receiving calls from folks that read the previous three hot attic columns. I am convinced that we have helped many of you find the solution to the problems that a hot attic can cause. And may I remind you that helping you, the readers of this column, is what this column is all about.

A gentleman recently called me and was very concerned about his high summer electric bills. I asked him all of my usual questions about his house and, based on his answers, agreed that he needed help. Because no two existing houses are exactly the same when considering energy efficiency, I suggested that he have a qualified energy auditor perform a detailed energy assessment of his house. Much to my surprise, he told me that he had an audit performed in 1996. *Let's see now, 2012 - 1996 = 16 years ago.* Yes, that's 16 years ago. I asked him if he still had a copy of the audit. He told me that he had it right at his fingertips. I asked him lots of questions about the audit. I learned that the audit was performed by a company that I considered to be totally qualified to test a house. I learned that the house, when tested, had an air leakage rating of .77 natural air changes per hour. Oh my lands, I thought. This house is what we call a 77 percent leak. For those of you that read this column regularly, you know that 77 percent leakage is not good. A house built to our suggested standards has a leakage rate of about 20 percent, which has proven through the years to be about perfect. Based on the audit report, the air infiltration was coming from many sources, such as recessed lights, wood trim, lack of door weather-stripping, attic access panels and serious ductwork problems, such as panned floor joists for the return air system. The report also mentioned a serious lack of attic insulation. Folks, while this may sound terrible, this is fairly typical for many older houses. At one point during our conversation, he said to me, "The problems are probably about the same as they were then because we have not made any of the suggested improvements." I actually felt sad for this family at that moment because I was certain that they had been paying higher than necessary utility bills for at least 16 years.

The reason that I tell you this story is because the audit report also gave the family a price quote to fix all of the problems. I am fairly certain that the family had sufficient funds to make those improvements but, for whatever reason, chose not to do so. The quoted price for the improvements in 1996 was far less than the cost to make the improvements in 2012. If the improvements had been made in 1996, the family would have already saved the amount spent on them by having lower utility bills for 16 years.

Now I want to commend this family. Although they wished that they made the improvements many years ago, they bit the bullet and hired a company to make the improvements in 2012. The extra money they spent on higher utility bills in 16 years would have more than paid for those improvements and their house would have been far more comfortable. So, I always say, the sooner you fix the problems, the better.

If your utility bills are higher than they should be, I suggest that you also obtain a comprehensive energy audit from a credentialed expert. If you are a member of an electric co-op, you can call the member services department for assistance. For dozens of energy saving tips and solutions, visit www.SmartEnergyTips.org.

See you in November when there just might be frost on the pumpkins.
THE SPEED OF LIGHT(ING)
Co-ops help blaze trails for efficient lighting technology

After maintaining a steady pace for a century, lighting technology has begun to leap forward, fueled by tightening energy efficiency standards and hefty incentives for manufacturers. And despite a bit of price shock on some lighting products, co-op members—especially large commercial and industrial accounts—are working with their local, not-for-profit, consumer-owned power providers to see if emerging lighting options can curb rising costs.

Shifting standards
Congress first enacted improved energy efficiency standards for incandescent bulbs under the federal Energy Independence and Security Act of 2007. But when new lightbulb rules began to take effect this year, they were met with confusion.

Under the law, by 2014, lightbulbs using between 40-100 watts must consume at least 28 percent less energy than traditional incandescents, which will save Americans an estimated $6 billion to $10 billion in lighting costs annually. The measure also mandates that lightbulbs become 70 percent more efficient by 2020.

LEDs: A Decade of Change
By 2014, lightbulbs using between 40-W to 100-W must consume at least 28 percent less energy than traditional incandescents, saving Americans an estimated $6 billion to $10 billion in lighting costs annually. The federal Energy Independence and Security Act of 2007 also mandates that lightbulbs become 70 percent more efficient by 2020. Light-emitting diodes (LEDs) are quickly evolving to meet this challenge. Learn more:

In June of this year, the U.S. House passed an amendment to stop enforcement of these standards, mirroring a funding freeze for enforcement efforts adopted in late 2011. Yet, even if the provision becomes law, very little will change. Congress has not repealed or adjusted existing lightbulb efficiency standards or changed the timeline for implementation. Major lighting manufacturers like General Electric, Philips and Osram Sylvania continue working to comply with the 2007 law.

As the next wave of standards kicks in, traditional 75-watt incandescent lightbulbs will no longer be available as of Jan. 1, 2013, and 40-watt and 60-watt versions will no longer be available as of Jan. 1, 2014. In the race to fill the nation’s growing need for efficient lighting comes a new breed of illuminators, led by light-emitting diodes (LEDs).

“Solid” lighting
Incandescent bulbs create light using a thin wire (filament) inside a glass bulb—a delicate connection that can easily be broken, as frustrated homeowners can attest. In contrast, LEDs are at the forefront of solid-state lighting—small, packed electronic chip devices. Two conductive materials are placed together on a chip (a diode). Electricity passes through the diode, releasing energy in the form of light.

Invented in 1960 by General Electric, the first LEDs were red—the color depends on materials placed on the diode. Yellow, green and orange LEDs were created in the 1970s, and the recipe for the color blue—the foundation for white LEDs—was unlocked in the mid-1990s. Originally used in remote controls, exit signs, digital watches, alarm clocks and car signal lights, LEDs quickly gained momentum for large-scale lighting.

By 2030, the U.S. Department of Energy estimates solid-state lighting technologies could reduce the amount of electricity used for lighting (currently 13.6 percent of the nation’s total) by half, saving up to $30 billion a year in energy costs.

Farming LEDs
Electric cooperatives are supporting LED study through the Cooperative Research Network (CRN), an arm of the Arlington, Va.-based National Rural Electric Cooperative Association (NRECA). Recently, CRN worked with Western Farmers Electric Cooperative, a generation and trans-
The T-Bar M Dairy Ranch, outside of Durant, Okla., normally uses 250-watt metal halide lights in its barns. CRN exchanged those bulbs in 10 fixtures with 120-watt LEDs. After six months, the dairy had cut energy use by 55 percent and boosted brightness by 30 percent.

mission cooperative based in Anadarko, Okla., and the Oklahoma State University Animal Science Department to evaluate LEDs at a farrowing operation and a dairy farm in the Sooner State. The project measured the effectiveness of LEDs in harsh environments and looked for any influence on animal behavior.

T-Bar M Dairy Ranch, outside of Durant, Okla., normally uses 250-watt metal halide lights in its barns. CRN exchanged those bulbs in 10 fixtures with 120-watt LEDs. After six months, the dairy had cut energy use by 55 percent and boosted brightness by 30 percent.

"Utility costs go up every year — that's reality," said Tami Tollenar, who manages the dairy. "To move forward in your business, you have to look for ways to be more efficient. LEDs are one of the things we can do to help us move forward."

CRN also worked with Robinson Family Farms, a 380,000-head hog operation in Holdenville, Okla. The farm already used compact fluorescent lamps (CFLs) but had problems because those bulbs didn't work well in harsh conditions.

"Lighting for a swine facility is pretty important," said owner Rich Robinson. "We try to convince the sows it's spring year-round to improve their eating habits."

CRN switched 25 fixtures from 26-watt CFLs to 15-watt LEDs. After six months, Robinson slashed his energy use by 54 percent.

"I was worried because normally when you see an LED it doesn't seem to put out as much light as a 150-watt incandescent bulb — it's a different type of light," Robinson said. "But, after installing the lights, I was surprised at how well they lit up the area. I think the LEDs actually outperformed the CFLs."

"The initial cost of LEDs is significantly higher than conventional lighting," noted Scott Williams, Western Farmers Electric commercial and industrial marketing manager. "Like all modern technology, you can
NEWS BRIEFS

LED-Strung Christmas Trees: Going fast!

If you'd like to buy an artificial Christmas tree strung with everlasting LED bulbs, buy it now. If you wait until after Thanksgiving, you probably won't be able to find a nice one.

LED-strung trees sell out quickly—even though they cost more than artificial evergreens with traditional lights—because the bulbs are long lasting. They're expected to burn without trouble for 200,000 hours, so they ought to last for at least 20 Christmases.

LED means light-emitting diode. The light is built into the light fixture, so there's no bulb to change. By the time the light burns out, you would need to replace the whole fixture—and tree—anyway.

Other benefits: LEDs are cool to the touch, so they're easier to handle and don't present a fire hazard when they come into contact with your tree's limbs. They use up to 90 percent less energy than traditional holiday lights. Their casings are shatterproof.

Take some of the hassle out of the holidays by switching to LEDs. Even if you don't want an artificial tree, you can replace your holiday lights with removable strings of LEDs.

But do it soon, or you might wind up waiting until next year to make the switch.

Gov. Beebe Visits with Co-op Employees

Gov. Mike Beebe shared his thoughts about a proposed state energy plan, Medicaid funding and other issues facing the state during an employee meeting on Oct. 12 at the Little Rock headquarters of Arkansas Electric Cooperatives, Inc. (AECI) and Arkansas Electric Cooperative Corporation (AECC). As for energy, Beebe said he supports diversity of generation fuel resources and praised the co-ops for having a diverse generation portfolio. He noted that affordable and reliable energy is a top priority. Duane Highley, president and chief executive officer of AECC/AECI, thanked the governor for speaking to employees and presented him with a framed copy of a 2009 issue of the cooperatives' member magazine, Rural Arkansas, now Arkansas Living, that featured Beebe on the cover. Highley said it was the only time a governor has been the topic of a cover story in the magazine.


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I certify that the statements made by me above are correct and complete. Ouida H. Cox, Editor
Dishwasher Uses Less Water Than Hand Washing

Gathering family members to help you carefully wash and dry your dishes by hand is a great way to keep everyone together in the kitchen after a big holiday dinner. It's also a big waste of hot water.

Cleaning dishes in the dishwasher uses 37 percent less water than washing them by hand. The reason: Most of us run the hot water constantly while washing plate after glass after casserole dish.

A tip: If you have a divided sink, plug the drains and fill one side with warm, soapy wa-
ter and the other with clear rinse water, and then turn the faucet off. You’ll use half as much water cleaning your dishes that way than if you run the dishwasher.

If you do load the dishwasher, wait until it's full to turn it on. If you have to rinse dried-
on food from dishes before you stack them in the dishwasher, use cold water only.

Always opt for the “energy-saving” cycle when you run your dishwasher. And deactivate the “heated drying” cycle in favor of letting the dishes air-dry overnight. You’ll save up to 10 percent on dishwashing costs if you do.

Choose Best Electric Knife to Carve Turkey This Year

Slicing through a turkey without tearing it to shreds or fighting to remove wings and legs isn't the easiest Thanksgiving-dinner chore.

A solution: An electric knife makes easy work of cutting uniform slices from even the turkey's hardest-to-reach places.

But don't base your choice of an electric knife simply on price or appearance. Take as much care with your selection as you would for any small appliance, because that's what an electric knife is.

Here are seven things to consider before buying an electric knife.

1. You get what you pay for. A top-of-the-line electric knife costs around $50. It is likely to last longer, stay sharper, come with safety features and run quietly — features that cheaper knives might not have.

2. You can choose a corded or a cordless electric knife. The cordless version needs charging between uses and is useful only as long as it holds its charge. Opt for one with a fairly long battery life, and don't forget to charge it before you put the Thanksgiving turkey on the table. The cordless version's cord can get in the way while you're cutting the bird, and you can use it only near a power outlet. If you like to slice the turkey right at the table so your hungry dinner companions can watch, you might want to invest in a cordless model.

3. Think about what you will use the electric knife for. If you'll pull it out only once a year to slice the Thanksgiving turkey, you probably can get away with: buying a version that comes with a single, long blade for slicing meat. But if you intend to use it year-round to slice bread and cut vegetables, you'll need a second, shorter blade.

4. If you will be slicing meat with your electric knife, buy one with enough “torque” to make that an easy job.

5. Try the knife "on" at the store. Pick it up and notice if it feels comfortable in your grip. Determine whether it's too heavy for you to handle comfortably. Notice if the knife has an "on" switch that you have to press on as you carve; that can make the chore awkward. Remove the blade to determine if it's easy enough to do. Listen to how loud it is and decide the level of noise you can tolerate.

6. Buy a knife that you can put in the dishwasher.

7. Consider investing in a model that comes with a storage tray for the knife, blades and cord. Choose a model with a safety lock to prevent little ones from opening the box and finding the sharp blades.
National Fire Awareness week took place recently, and I am fairly certain that it was so designated because it was the beginning of the heating season. They gave several safety tips, which included having the gas furnace checked by a qualified person, checking or installing a smoke detector, and installing a carbon monoxide detector. And let me make it clear that I agree with their suggestions. As I thought about these very important, perhaps even life saving suggestions for a few moments, I was happy to realize that only one of these suggestions was applicable to our house and to the house of our grandchildren. That item is a smoke detector, and in my opinion, every house should have at least one. However, we do not need a carbon monoxide detector or a furnace inspection because there are no natural gas appliances in either house. The more that I thought about it, the more that I felt that I should explain to you why we have not suggested installing any gas appliances in any house for the last 25 years.

As I have written in an earlier issue of this magazine, my introduction to energy efficiency was in the 1970s while I was working for an agency of the federal government that provided funds to build houses for moderate-income families. For several years, those funds were used for single-family houses only. Some of those houses were heated with natural gas, some with propane, some with electricity and a few with wood. It is hard for me to believe this now, but most of those early houses had little, if any, insulation. Later, President Jimmy Carter challenged America to conserve energy and make houses more energy efficient. As the state architect for the agency responsible for loaning millions of dollars to provide new houses for families in Arkansas, I started trying to learn everything I could about energy efficiency. I quickly learned that you cannot believe everything that you hear about that subject. Well, I was determined to do what was best for the future homeowner, but I seemed to have opposition just about every time that I suggested change. There were times when I was very discouraged and wondered if it was worth the fight.

About this same time, we were notified that we would also be receiving funds to provide multifamily housing. As an architect, that was really good news to me. This program grew really fast; almost too fast in fact. To help with the program, my boss appointed Julius Baird, an engineer, as the multifamily housing coordinator. Almost immediately after his appointment, Julius called me to his office. He told me that he wanted to have the best program in the country and that he would support me in making our program the leader using energy efficiency. I told him that this was music to my ears. Then he said that he wanted all of the apartment units to be all electric. "Do what?" I said. And he told me that an all electric unit would be safer and more efficient than if gas was used. I had no idea if he was right, but I knew that he was serious. After months of our working together, I was convinced that he was correct. And this was the way before we had the diagnostic tools that we have today, which also will prove that he was right. Not everyone agreed with us, but we controlled the funds, so we funded only all-electric units. One developer who had already built 20 units acquired adjacent land and built eight more identical units. But he was convinced that using gas for cooking, water heating and heating would be cheaper for the tenant. So, without our approval, he installed gas appliances in those eight units. We could have forced the developer to change the units to all electric, but we decided that this would be a great test of our opinion. Two years later, that developer showed us the utility bills for all 28 units. All eight of the gas units had considerably higher average utility bills than the all-electric units. Julius was right again.

In the years since I have had many other similar stories, but I want to talk safety with you in this column. I do not believe that all houses that have gas appliances are unsafe. However, based on many years of experience, the potential for problems is significantly higher if the house has gas appliances. A typical all-electric house has no carbon monoxide problems. And an all-electric house has no combustion air requirements and
no appliance venting requirements where back drafting might occur. We have lots of examples, but just look at the recent picture accompanying this column that was taken by an electric co-op employee who is a credentialed Arkansas Building Performance Institute building analyst at a house owned by a co-op member. Do you see any potential safety problems?

A gas water heater placed near a home’s return air can cause potential health and safety issues.

Well, it has a problem. Please notice that the return air grille is very close to the water heater gas flue. When the heating system is running, the return will pull air from the easiest location, which is, in this case, the gas flue. Testing shows that back drafting does occur when water is being heated at the same time that the furnace is running. The return air is causing the gas flue to be under negative pressure and is sucking bad air, including carbon monoxide, into the duct system and then distributing it into the rest of the house. Thankfully, this problem was found and the solution is simple. The family should install an efficient electric water heater in place of the existing gas unit and seal the flue hole at the ceiling. Then the house would be safer and the utility bills would be lower.

We hope this information will help someone avoid a similar safety threat. We want everyone to have a safe and Happy Thanksgiving. See you in December.
New Year’s Resolution: Save Energy

Every January, most of us resolve to save money and lose weight. This year, how about resolving to save energy and lose old power-wasting habits?

Here are some resolutions that will be easy to keep:

1. If any of the overhead fixtures, table lamps or outdoor lights around your house still have those old, incandescent light bulbs, change them to CFLs or LEDs. CFLs and LEDs are more energy efficient, so they waste less electricity and can reduce your power bill.

2. Unplug computers, TV sets, phone chargers and the coffee maker and other kitchen countertop appliances when you're not using them. They still draw electricity as long as they are plugged in, even if they are turned off. Collectively, their energy use adds up. When your devices are consuming energy but you are not benefiting from it, you're wasting it.

3. Buy ENERGY STAR® appliances when you replace anything from a computer to a refrigerator to the battery charger for your power tools. The ENERGY STAR® label guarantees that the appliance uses less electricity to operate than comparable products without the label. That means you'll spend less to operate them year after year.

NEWS BRIEFS

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LET'S JUST DO IT... OTHERS HAVE!

Wow, time really does pass quickly. Since my last column, both a hurricane and a major winter storm have pounded the northeastern United States. The storms left millions without electricity. Hundreds of crews were sent by electric utilities, including Arkansas’ electric cooperatives, to help restore this wonderful product called electricity. I heard several families say on TV say that they did not realize how many ways that they used electricity until they were without it. When I conduct my energy efficiency seminars at your local co-op, I show one PowerPoint slide that reads, "But the facts are, it is an all electric world." Yes, virtually everything in a house depends on electricity, even natural gas furnaces and clothes dryers.

I have always been impressed with the way that electric utilities work together to restore power during a time of crisis. Furthermore, many of the utilities hit by Hurricane/Superstorm Sandy were “investor-owned, for-profit utilities,” not “member-owned, non-profit” businesses like your electric cooperative. And although those business models differ greatly, they worked together during a difficult situation to restore electricity to those without. What a beautiful example of electric utility workers from all walks of life across America working together to improve the quality of life for those in need. I hope our elected officials will take note of their unity.

Let's move on to energy efficiency. While going through the mail, I opened a letter from a lady who had attended my recent seminar at Craighead Electric Cooperative. I would like to share the entire letter, but there just isn't enough space within this column. So I will just give you excerpts, exactly as written within the letter.

"Doug: Well, I have debated on whether to write you about my electric bill, but I wanted you to know how pleased I am. Your advice worked. We talked last summer about adding insulation to my attic. My Uncle Shepherd at church said that he would help me. For many Friday mornings, Louis would have three (insulation) machines available. When we got there, they were all checked out. Finally, one Saturday in January, we got it done. We discovered there wasn't any insulation over my laundry room, which explains why it was like killing bugs in there in the winter and hot as Hades in the summer.

These are the things I noticed that were different after the insulation was added.
1. Felt warm when I walked into the laundry room. This was a first.
2. House was comfortable at 68 degrees. Did not have to layer clothing.
3. Did not have to turn on back-up heat (gas stove).
4. Summer thermostat set at 78 (did not change at any time) and house was comfortable even on hottest days.
5. Did not have to turn on floor fans to stay cool.
6. Children, when they visited, did not complain that the house was too hot. First time ever.
7. Unit does not run for what seems forever. I used to hear it running forever when I woke in the middle of the night. Now when I wake up, I wonder why it isn't running.
8. Electric bill is reasonable. Hallelujah!"

She also mentioned that she caulked “like mad” and installed a Marathon water heater. Her last sentence says, “Thanks for taking the time to read my saga, but most of all thanks for all the help you give everyone on ways to cut down on energy costs.”

Folks, the improvements that we teach always work. Just look at what adding cellulose attic insulation, caulking and installing a Marathon water heater did for this member. And you can do it, too. Letters like these are humbling and make me proud to be affiliated with the Electric Cooperatives of Arkansas. We've worked closely together for more than a decade to teach you how to take charge of your utility bills and improve the comfort of your home. Feedback like this is very rewarding, and I thank all of you who take the time to write.

Before I sign off, here’s a couple of parting energy efficiency tips sure to help you and others save energy. Consider using LED lighting on your Christmas tree and around the house. LEDs use up to 75 percent less wattage than their incandescent counterparts and will last for many years. Also, give the gift of energy efficiency this year. There are dozens of affordable energy-saving items available at building supply centers that make for perfect stocking stuffers.

Merry Christmas!
Exhibit Nine
Trenching for the pipe for the geothermal system was done by Rood Heating and Air Conditioning from Russellville, Arkansas.
A Palestine, Arkansas family has become the fifth in as many years to win a $50,000 Energy Efficiency Makeover in the Electric Cooperative of Arkansas Energy Efficiency Makeover Contest. Lee and Berthella Thomas made a special effort to enter the contest this year after missing the deadline for last year’s contest. Berthella Thomas says she was interested in the makeover when she read about it because her home’s windows needed replaced and an addition to the home is difficult to heat and cool.

The Electric Cooperatives of Arkansas (ECA) have long promoted energy efficiency. A commitment to community and energy education led them to devise the makeover contest as a way to also expand that outreach.

The Energy Efficiency Makeover Contest has become a major focal point of the ECAs effort to educate members and the general public about energy efficiency. Although the project awards the energy makeover to only one family each year, the project is designed to have a much broader impact. The entire makeover is documented and shared in a number of ways. Arkansas Living Magazine, the monthly publication of ECA always features the annual home makeover and family and the ECA website carries photos and weekly updates on each project.

The Thomas family, members of Woodruff Electric Cooperative, knew in August that they were contest semi-finalists and would receive a General Electric GeoSpring Hybrid water heater given to semi-finalists. To be eligible for the contest, applicants had to be members in good standing with one of Arkansas' 17 electric distribution cooperatives and have all-electric homes. The contest was announced in May and drew applications from nearly 2,000 electric co-op members across the state. After review by co-op staff, 17 semi-finalists, one from each electric distribution cooperative were selected. Then four homes were chosen as finalists.
Rood Heating and Air Conditioning also did the work on the trench for the header.  
(Photoby Gary Bean, The Electric Cooperatives of Arkansas)

After conducting energy audits and site visits on each of those homes, a committee reviewed results and selected the winner.

Brett Curry, residential energy marketing manager for the Electric Cooperatives of Arkansas, performed the comprehensive energy audit in the Thomas's 1,800-square-foot single-story home. Built as a 1,150-square-foot home in the early 1950s, the home had a garage and breezeway enclosed 30 years later for more space. Curry's energy audit of the house showed a very high level of air infiltration.

A blower door test was also done, followed by thermal imaging with an infrared camera to spot other problem areas in the home's envelope and insulation. Those tests showed that the house measured a rate of nearly 70 percent natural air exchange per hour, meaning that 70 percent of the air within the home exchanged with outside air every hour. Energy efficient homes have an air exchange between 20 to 30 percent per hour.

Curry said little or no thermal boundary existed in the home. Sidewalls of the original structure were not insulated. And even though the attic had some rock wool and cellulose insulation, both were improperly installed and were inadequate for Arkansas' climate.

"The air leakage is related to older construction methods, poor windows, inadequate and improperly installed insulation and other building envelope penetrations," Curry said. The makeover goal, Curry says, is to install the latest in energy efficiency components to allow the family to experience a higher level of comfort in their home and realize significant savings on their electric bill. According to Curry, the average electric cooperative member uses around 1,100 kilowatt-hours of electricity per month. He said the Thomas home was averaging nearly 1,900 kilowatt-hours per month.

To change that picture and increase the family's comfort, the makeover crew set to work in mid-August. The home had to be sealed from all of the air infiltration for the new energy measures to be effective. The makeover's first week would make a dramatic change for the good.

Tommy Grady, owner of Building Performance Solutions, Inc., from Mountain Home, Arkansas brought his crew in to install open-cell foam in the attic. Roof decking, rafter and gable ends were coated with Demilec Sealsection 500 spray foam insulation, to create an "attic encapsulation," a technique Curry says is beginning to catch on across the country. He says that foamed attics in the previous makeover
Total Service Company workers drilled four 210-foot bore holes with 20-foot spacing in the home’s front yard.

(Photo by Gary Bean, The Electric Cooperatives of Arkansas)
projects seldom reach a temperature of more than 10 degrees higher than the conditioned air space.

To insulate existing sidewalls, BPSi drilled small access holes into the brick mortar and installed a product called RetroFoam. Derived from organic materials, RetroFoam insulated the sidewalls from the ground level to the top plate where it joined the encapsulated attic to provide a moisture barrier, a thermal barrier and air barrier. “Since RetroFoam can be installed from the outside it is not intrusive,” Curry says. “No tearing out walls, or moving furniture and no interior cleanup.”

As the crews working on the makeover home tightened up the house’s envelope and decreased air infiltration, relative humidity within the home increased. Original auditing had shown humidity was already high at nearly 70 percent. And that was with the air conditioner running. To head off indoor air quality issues, makeover crews installed 80 CFM exhaust fans in the bathrooms. The GE Hybrid water heater will also remove moisture from latent heat as it works to provide hot water. The new Water Furnace Envision Series 5 HVAC system will also assist in managing a consistent comfortable relative humidity level year round.

Also during week one, Chris Burnley, regional manager with GE Appliance Division, helped lead the energy efficiency charge by supplying the latest Energy Star appliances for the kitchen and laundry area. Energy Star appliances incorporate the latest energy saving features and use up to 30 percent less energy than older appliances. The Thomas’s appliances were well over 20 years old.

Fred Danforth and his crew from Total Service Company located in Pontotoc, Mississippi, arrived on the project site early in the second week to do the geothermal heat exchange work. Danforth’s bunch drilled four 210-foot bore holes spaced 20 feet apart and installed loops in front of the home. Danforth and Total Service work in a 16 state area and are kept busy putting in geothermal loops.

The older package model HVAC system was located on the southwest corner of the house, a counterproductive location in direct sunlight with no shade. Reflective temperatures from the brick wall were in excess of 140 degrees from noon to late afternoon in the summer.

Rood Heating and Air Conditioning from Russellville, Arkansas, under Eddie Rood, did the fusion of the borefield loops and manifolds. Rood also installed the Water Furnace Envision heat pump recommended by area Water Furnace representative Don Brown, and tied it to the GE GeoSpring Hybrid water heater. AECC has posted a YouTube video to show geothermal installation details and a host of other products and technologies used on the makeover homes at their site www.aecc.com under their Energy Efficiency Home Makeover tab.

The GE GeoSpring Hybrid water heater, an ultra efficient model projected by the Department of Energy to save approximately $325 annually, was installed for the Thomas family by Rood. The electric GE GeoSpring has an Energy Factor (EF) of 2.4. Plus the domestic hot water feature from the geothermal heating and cooling system will preheat inbound water to the water heater. This desuperheater feature on the Water Furnace Envision geothermal system will capture some of the exhaust BTUs being removed from the house while in the air-conditioning mode and distribute them into the water heater. This process is more efficient than standard natural gas, propane or electric resistance heating.

A “duct blaster” test showed 300-cubic-feet-per minute air leakage from the ductwork. Visual inspection showed ductwork disconnected in several locations and missing insulation in many areas. Ducting to the addition was not installed correctly. Rood Heating and Air Conditioning reattached, sealed and insulated the entire existing duct system. They also added a new properly-sized and sealed ductwork system within the encapsulated attic to supply the addition on the north end of the home.

The windows Berthella Thomas hoped for started showing up during the second week with Mark Barr and his guys. WeatherBarr windows from Harry G. Barr Company of Fort Smith, Arkansas, with a U-factor of .30, replaced the single-paned wooden framed windows originally put in the home. The vinyl frame, low-E glass, Argon gas filled WeatherBarr units are high-efficiency rated and carry a Solar Heat Gain Coefficient (SHGC) of .22. Low-E coating on the glass will reflect or absorb the sun’s radiant heat. Makeover crews also addressed several problems with entry doors by adding high-quality weather stripping and adjusting locksets and strike plates for a proper seal.

Volunteers from both Woodruff and Ozarks Electric Cooperative attacked caulking and sealing duties using more
than 70 tubes of silicone-based acrylic caulk and 24 cans of foam sealant. Their efforts in concert with the other infiltration correction measures helped to give the makeover home an air-infiltration reduction of 33 percent.

Crews also finished the work the Thomas’s had started by replacing any remaining incandescent lighting throughout the home with compact fluorescent and LED bulbs.

A typical range of concerns and difficulties were encountered during the 2012 $50,000 Energy Efficiency Makeover, including a lost day with concern over the Labor Day weekend Hurricane Isaac storm, and drilling through an aquifer. The makeover crews accomplished their goals and gave the Thomas family a comfortable and affordable energy efficient home.

Curry says the 2011 Energy Efficiency Makeover home’s electric bills are averaging $65 monthly.
Exhibit Ten
April 23, 2012

Mr. Forest Kessinger
Manager Rates & Forecasting
Arkansas Electric Cooperatives Corporation
1 Cooperative Way
Little Rock, Arkansas 72219-4208

RE: Energy Efficiency Arkansas - Budget Allocation

Dear Mr. Kessinger,

In accordance with the Memorandum of Understanding signed by Arkansas Electric Cooperatives Corporation and pursuant to the Public Service Commission Docket No. 07-083-TF, Order No. 24, please remit $139,215.20 the pro-rata share for Arkansas Electric Cooperatives Corporation for programs and activities for the period of January 1, 2012 through December 31, 2012, under the Energy Efficiency Arkansas statewide information and education initiative. The check should be made to the AEDC – Energy Office at the following address:

AEDC-Energy Office
900 West Capitol Ave. Ste 400
Little Rock, Arkansas 72201

For your convenience, a copy of the cost breakdown by company is attached.

If you have any questions, please contact Tim Scott, Arkansas Energy Office, at 501-682-2433 or tscott@arkansasedc.com.

Sincerely,

Tim Scott
EEA Coordinator
Arkansas Energy Office
<table>
<thead>
<tr>
<th>Utility</th>
<th>07/01/10 - 12/31/10</th>
<th>Invoice Total Billed 7/2010</th>
<th>Over payment based on Revised MOU</th>
<th>01/01/11 - 12/31/11</th>
<th>New Invoice Total (Invoice total 2011 minus Over payment based on Revised MOU)</th>
<th>Invoice 01/01/12 - 12/31/12</th>
<th>Comprehensive MOU Invoice Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas Valley Electric Cooperative Corporation</td>
<td>7,165.45</td>
<td>10,323.51</td>
<td>(3,158.06)</td>
<td>10,826.61</td>
<td>14,151.22</td>
<td>35,301</td>
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<td>Ashley-Chicot Electric Cooperative, Inc.</td>
<td>839.47</td>
<td>1,053.10</td>
<td>(213.63)</td>
<td>1,263.88</td>
<td>1,424.76</td>
<td>4,136</td>
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<tr>
<td>C&amp;L Electric Cooperative Corporation</td>
<td>3,198.68</td>
<td>4,318.15</td>
<td>(1,119.46)</td>
<td>5,224.81</td>
<td>6,137.16</td>
<td>15,759</td>
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</tr>
<tr>
<td>Carroll Electric Cooperative Corporation</td>
<td>11,047.11</td>
<td>15,303.85</td>
<td>(4,256.74)</td>
<td>17,560.43</td>
<td>21,817.20</td>
<td>54,425</td>
<td></td>
</tr>
<tr>
<td>Clay County Electric Cooperative Corporation</td>
<td>2,176.12</td>
<td>2,641.24</td>
<td>(465.12)</td>
<td>3,276.36</td>
<td>4,297.98</td>
<td>10,721</td>
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<tr>
<td>Craighead Electric Cooperative Corporation</td>
<td>6,356.08</td>
<td>6,519.49</td>
<td>(163.41)</td>
<td>12,054.09</td>
<td>12,552.77</td>
<td>31,314</td>
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<tr>
<td>Empire District Electric Company, The</td>
<td>904.83</td>
<td>974.32</td>
<td>(69.50)</td>
<td>1,656.04</td>
<td>1,788.97</td>
<td>4,458</td>
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<tr>
<td>Entergy Arkansas, Inc.</td>
<td>160,994.59</td>
<td>177,216.49</td>
<td>(16,221.91)</td>
<td>161,038.05</td>
<td>317,822.04</td>
<td>793,157</td>
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<tr>
<td>Farmers Electric Cooperative Corporation</td>
<td>947.08</td>
<td>1,146.97</td>
<td>(199.89)</td>
<td>1,948.14</td>
<td>1,778.42</td>
<td>6,666</td>
<td></td>
</tr>
<tr>
<td>First Electric Cooperative Corporation</td>
<td>11,457.16</td>
<td>16,603.56</td>
<td>(5,146.40)</td>
<td>22,538.87</td>
<td>22,827.02</td>
<td>56,445</td>
<td></td>
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<tr>
<td>Mississippi County Electric Cooperative, Inc.</td>
<td>911.75</td>
<td>1,027.39</td>
<td>(115.64)</td>
<td>2,087.77</td>
<td>1,800.64</td>
<td>4,602</td>
<td></td>
</tr>
<tr>
<td>North Arkansas Electric Cooperative, Inc.</td>
<td>5,209.13</td>
<td>7,218.18</td>
<td>(2,009.05)</td>
<td>10,166.56</td>
<td>10,287.83</td>
<td>25,583</td>
<td></td>
</tr>
<tr>
<td>Oklahoma Gas and Electric Company</td>
<td>13,129.08</td>
<td>14,541.85</td>
<td>(1,412.77)</td>
<td>26,065.78</td>
<td>25,929.94</td>
<td>64,682</td>
<td></td>
</tr>
<tr>
<td>Ouachita Electric Cooperative Corporation</td>
<td>1,595.48</td>
<td>2,007.75</td>
<td>(412.27)</td>
<td>3,110.97</td>
<td>3,150.96</td>
<td>7,860</td>
<td></td>
</tr>
<tr>
<td>Ozarks Electric Cooperative Corporation</td>
<td>7,382.61</td>
<td>10,716.19</td>
<td>(3,333.58)</td>
<td>14,048.08</td>
<td>14,509.88</td>
<td>36,371</td>
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</tr>
<tr>
<td>Petit Jean Electric Cooperative Corporation</td>
<td>2,979.94</td>
<td>3,914.72</td>
<td>(934.78)</td>
<td>5,850.94</td>
<td>5,885.16</td>
<td>14,681</td>
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<tr>
<td>Rich Mountain Electric Cooperative, Inc.</td>
<td>1,077.55</td>
<td>1,579.42</td>
<td>(501.87)</td>
<td>2,081.17</td>
<td>2,128.00</td>
<td>5,309</td>
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<tr>
<td>South Central Arkansas Electric Cooperative, Inc.</td>
<td>1,585.74</td>
<td>2,101.61</td>
<td>(515.88)</td>
<td>2,596.45</td>
<td>2,613.71</td>
<td>7,812</td>
<td></td>
</tr>
<tr>
<td>Southwest Arkansas Electric Cooperative Corporation</td>
<td>4,131.87</td>
<td>5,429.26</td>
<td>(1,297.39)</td>
<td>6,666.90</td>
<td>8,106.12</td>
<td>21,356</td>
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<tr>
<td>Southwestern Electric Power Company</td>
<td>24,472.85</td>
<td>26,323.72</td>
<td>(1,850.87)</td>
<td>45,763.19</td>
<td>48,332.02</td>
<td>120,058</td>
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<tr>
<td>Woodruff Electric Cooperative Corporation</td>
<td>2,430.20</td>
<td>3,700.43</td>
<td>(1,270.23)</td>
<td>4,472.98</td>
<td>4,769.47</td>
<td>11,973</td>
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</tr>
<tr>
<td>Arkansas Oklahoma Gas Corporation</td>
<td>8,428.13</td>
<td>10,001.21</td>
<td>(1,573.02)</td>
<td>15,478.25</td>
<td>16,644.91</td>
<td>41,522</td>
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<tr>
<td>Arkansas Western Gas Company - Northwest and Northeast</td>
<td>27,787.77</td>
<td>33,049.64</td>
<td>(5,262.06)</td>
<td>37,831.70</td>
<td>48,970.60</td>
<td>136,699</td>
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<td>CenterPoint Energy Anka, a division of CenterPoint Energy Resources Corp.</td>
<td>75,165.33</td>
<td>91,696.72</td>
<td>(15,530.39)</td>
<td>106,347.03</td>
<td>150,462.19</td>
<td>375,340</td>
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</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>362,395.00</strong></td>
<td><strong>449,493.00</strong></td>
<td><strong>(67,148.00)</strong></td>
<td><strong>746,313.00</strong></td>
<td><strong>879,259.00</strong></td>
<td><strong>1,883,909</strong></td>
<td><strong>375,340</strong></td>
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<tr>
<td><strong>Previous MOU Schedule A</strong></td>
<td><strong>449,409.00</strong></td>
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<td></td>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Combined Invoice for Cooperatives</strong></td>
<td><strong>$ 70,191.43</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Exhibit Eleven
Frontier Associates LLC  
1515 S. Capital of Texas Hwy, Ste. 110  
Austin, TX 78746

Invoice

<table>
<thead>
<tr>
<th>Date</th>
<th>Invoice #</th>
<th>Terms</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/31/2012</td>
<td>6674</td>
<td>Net 30</td>
<td>189</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>Description</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
</table>
| Angel Moreno | 11.11 | 189-Arkansas Deemed Savings Support  
Arkansas Electric Cooperative will be billed on  
75.81%/28.93% split  
October 2011  
Work completed according to Frontier’s SOW 6  
submitted by email to utilities 12/2/11  
Energy Analyst II | 105.00 | 1,166.55 |
| Mark Kapner     | 4   | Director of Engineering  
November 2011  
Work completed according to Frontier’s SOW 6  
submitted by email to utilities 12/2/11 | 175.00 | 700.00  |
| Angel Moreno | 21.57 | Energy Analyst II  
December 2011  
Work completed according to Frontier’s SOW 6  
submitted by email to utilities 12/2/11 | 105.00 | 2,264.85 |
| Derek R. Neumann | 4 | Associate Engineer  
| Greg W. Landreth | 3.17 | Senior Associate  
6  
| Jason Fialkoff | 9 | Senior Associate | 120.00 | 380.40  |
| Angel Moreno | 3.38 | Energy Analyst II  
December 2011  
Work completed according to Frontier’s SOW 6  
submitted by email to utilities 12/2/11 | 105.00 | 354.90  |
| Derek R. Neumann | 5 | Associate Engineer  
| Mark Kapner     | 6   | Director of Engineering  
| Jason Fialkoff | 12 | Senior Associate | 120.00 | 1,440.00 |
| Greg W. Landreth | 3.56 | Senior Associate | 120.00 | 427.20  |
| Adjustment-Engin... | | Total Amount of Invoice  
| Adjustment-Engin... | | Electric Portion of total bill @ 75.81%  
|                        | | Portion of total Electric bill @ 28.93%  
|                        | | Total Amount of Invoice  
|                        | | Electric Portion of total bill @ 75.81%  
|                        | | Portion of total Electric bill @ 28.93%  
|                        | | Project Manager: Angel Moreno |

Please contact the Project Manager with any questions. Thank You, Frontier Associates

Sales Tax (6.75%) $0.00

Payments/Credits $0.00

Balance Due $2,121.66

Frontier Associates LLC  
1515 S. Capital of Texas Hwy, Ste. 110  
Austin, TX 78746

---

**Bill To**  
Arkansas Electric Cooperative Corp.  
Forest Kessinger  
Manager, Rates & Forecasting  
P.O. Box 194208  
Little Rock, AR 72219-4208

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>Description</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angel Moreno</td>
<td>1.28</td>
<td>189-Arkansas Deemed Savings Support</td>
<td>110.00</td>
<td>140.80</td>
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<tr>
<td></td>
<td>2.86</td>
<td>Arkansas Electric Cooperative will be billed on .2044 percentage of total invoice</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>April 2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>April 30th PWC Meeting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mark Kapner</td>
<td></td>
<td>Energy Analyst II</td>
<td>175.00</td>
<td>500.50</td>
</tr>
<tr>
<td>Expenses - Engine...</td>
<td></td>
<td>Director of Engineering</td>
<td>48.48</td>
<td>48.48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4/29-30/12 Mark Kapner Meeting Arkansas Utilities:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hotel $178.88, Meals $22.32, Taxi $36</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SUBTOTAL</td>
<td></td>
<td>689.78</td>
</tr>
</tbody>
</table>

Project Manager: Angel Moreno

---

**RECEIVED**  
AECC ACCOUNTING  
713/930.261  
Project Code  
F Klauser  
RB

Please contact the Project Manager with any questions. Thank You, Frontier Associates

| Sales Tax (6.75%)    | $0.00 |
| Payments/Credits     | $0.00 |
| Balance Due          | $689.78 |
Frontier Associates LLC
1515 S. Capital of Texas Hwy, Ste. 110
Austin, TX 78746

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>Description</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angel Moreno</td>
<td>1.82</td>
<td>Energy Analyst II</td>
<td>110.00</td>
<td>200.20</td>
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<tr>
<td>Bill Brooks</td>
<td>1.43</td>
<td>Principal rate</td>
<td>210.00</td>
<td>300.30</td>
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<tr>
<td>Mark Kapner</td>
<td>0.5</td>
<td>Director of Engineering</td>
<td>175.00</td>
<td>87.50</td>
</tr>
<tr>
<td>Angel Moreno</td>
<td>2</td>
<td>SUBTOTAL</td>
<td>110.00</td>
<td>220.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SUBTOTAL</td>
<td>220.00</td>
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</tbody>
</table>

Project Manager: Angel Moreno

Please contact the Project Manager with any questions. Thank You, Frontier Associates

<table>
<thead>
<tr>
<th>Sales Tax (6.75%)</th>
<th>$0.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payments/Credits</td>
<td>$0.00</td>
</tr>
<tr>
<td>Balance Due</td>
<td>$808.00</td>
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</table>
Frontier Associates LLC
1515 S. Capital of Texas Hwy, Ste. 110
Austin, TX 78746

Invoice

<table>
<thead>
<tr>
<th>Date</th>
<th>Invoice #</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/10/2012</td>
<td>7736</td>
</tr>
</tbody>
</table>

Bill To
Arkansas Electric Cooperative Corp.
Forest Kessinger
Manager, Rates & Forecasting
P.O. Box 194208
Little Rock, AR 72219-4208

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>Description</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Fee - Engin...</td>
<td></td>
<td>189-Arkansas Deemed Savings Support Part 1 SOW-Reduced Costs to Budgeted Amount: Details Attached SUBTOTAL</td>
<td></td>
<td>23,953.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Project Manager: Angel Moreno</td>
<td></td>
<td>23,953.00</td>
</tr>
</tbody>
</table>

Please contact the Project Manager with any questions. Thank You, Frontier Associates

Sales Tax (6.75%) $0.00
Payments/Credits $0.00
Balance Due $23,953.00
Exhibit Twelve
Arkansas Home Builders
1400 W Markham, Ste 305
Little Rock, AR 72201
Phone 501-663-1428
Fax 501-663-4624

TO: Arkansas Electric Cooperative
Attn: Forrest Kessinger
1 Cooperative Way
Little Rock, AR

FOR: Energy Code Class

DATE: OCTOBER 3, 2012

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Code Class Sponsor</td>
<td>30,000.00</td>
</tr>
</tbody>
</table>

Make check payable Arkansas Home Builders
Payment is due within 30 days.
If you have any questions concerning this invoice, contact Julie Mills, 501-663-1428; juliemills@tcworks.net

Thank you for your business!
Exhibit Thirteen
Electric Cooperatives of Arkansas

Demand Response Report for the Electric Cooperatives of Arkansas

Arkansas Electric Cooperative Corp.
Your Local Energy Partner

Rates and Forecasting Department
Arkansas Electric Cooperative Corporation
The Electric Cooperatives’ Demand Response Report

The Electric Cooperatives are the National Leader in Demand Response Programs:

The Electric Cooperatives of Arkansas, consisting of Arkansas Electric Cooperative Corporation ("AECC") and its seventeen member cooperatives1, have been the most aggressive and successful utility system in the nation with regard to offering and implementing demand response programs.

On 25 June 2012 at 1800 hours CDST, AECC established an annual summer firm peak demand of approximately 2,343 MW. At that time, the Electric Cooperatives had an additional approximate 735 MW of potential demand that was either being interrupted or was available for interruption (interruptible demand). This ratio of interruptible demand to total potential demand (actual firm demand plus potential interruptible demand) is approximately 24%. The ratio of interruptible demand to firm demand is approximately 31%. The Electric Cooperatives do not know of another electric utility system in the nation with a higher ratio of demand response to load.

The Electric Cooperatives’ demand response efforts are so significant that they provide approximately one half of the demand response found within the entire Southwest Power Pool ("SPP") footprint. The SPP is one of nine Regional Reliability Councils within the North American Reliability Corporation (NERC). A January 2009 publication titled Retail Demand Response in Southwest Power Pool ("SPP Report") determined that the 30 load-serving entities within SPP have a potential demand response of 1,552 MW. The SPP Report further states that: “Arkansas accounts for ~50% of the DR [demand response] resources in the SPP footprint; these DR resources are primarily managed by cooperatives."2 (i.e., the Electric Cooperatives)

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1 Arkansas Valley Electric Cooperative Corporation; Ashley-Chicot Electric Cooperative, Incorporated; C&L Electric Cooperative Corporation; Carroll Electric Cooperative Corporation; Clay County Electric Cooperative Corporation; Craighead Electric Cooperative Corporation; Farmers Electric Cooperative Corporation; First Electric Cooperative Corporation; Mississippi County Electric Cooperative, Inc.; North Arkansas Electric Cooperative, Incorporated; Ouachita Electric Cooperative Corporation; Ozarks Electric Cooperative Corporation; Petit Jean Electric Cooperative Corporation; Rich Mountain Electric Cooperative, Incorporated; South Central Arkansas Electric Cooperative, Incorporated; Southwest Arkansas Electric Cooperative Corporation; and Woodruff Electric Cooperative Corporation.

To fully appreciate the magnitude of the Electric Cooperatives' demand response efforts, one may look at the Electric Cooperatives' relative position within the SPP. The SPP covers a geographic area of approximately 255,000 square miles. The SPP is charged with regional reliability and provides transmission oversight to portions of Arkansas, Kansas, Louisiana, Missouri, Nebraska, New Mexico, Oklahoma, and Texas. The 30 load serving entities within the SPP provide electrical service to approximately 4.5 million customers and have a non-coincident peak demand of approximately 43,000 MW.

The Electric Cooperatives' Approach to Successful Demand Response:

The Electric Cooperatives' success in demand response has been achieved through many years of steady effort. In 1978, certain member cooperatives began using clock timer switches to control water heaters and irrigations loads. Clock switches were eventually replaced by radio-controlled load switches. As demand response became more prevalent, a statewide System Control and Data Acquisition (“SCADA”) system was installed to provide the Electric Cooperatives with more sophisticated and timely load data. The receipt of virtually instantaneous data allowed the Electric Cooperatives to more surgically direct their demand response efforts.

The Electric Cooperatives continue to maintain their state-of-the-art approach to demand response by using the Internet to directly provide participating commercial and industrial (“C&I”) retail consumers with current, minute-by-minute, AECC load data. This data allows participating C&I consumers to better choose how to operate their businesses during peak summer periods.

To encourage demand response, the Electric Cooperatives have maintained rates and charges that closely adhere to their cost of service. These rates and charges provide the economic incentives for retail consumers to voluntarily participate in demand response.

Perhaps the SPP Report best summarized the Electric Cooperatives' approach when it stated: “The very high penetration levels of demand response in Arkansas cooperatives can be traced to three factors: (i) long-term stability in the type of price signals sent; and (ii) sufficient bill savings potential to gain active customer participation and interest; and (iii) avoiding over-payment of incentives, so there is sufficient savings for participants, non-participants, and utility management.”

Demand Response Program Description:

While each member cooperative may have certain terms and conditions that are specific to their demand response offerings, and not every member
cooperative offers both Category 1 and Category 2 demand response, all of the Electric Cooperatives' demand response offerings fall within three basic categories. These categories are:

Table-1

<table>
<thead>
<tr>
<th>D.R. Category</th>
<th>Demand Response Program</th>
<th>Achieved Demand Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Member Co-op Direct Control</td>
<td>120 MW</td>
</tr>
<tr>
<td>2</td>
<td>Member Co-op C&amp;I Voluntary Peak Avoidance</td>
<td>95 MW</td>
</tr>
<tr>
<td>3</td>
<td>AECC Controlled Industrial Loads</td>
<td>520 MW</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>735 MW</td>
</tr>
</tbody>
</table>

**Category 1 – Member Cooperative Direct Control:**

In Category 1 demand response (member cooperative direct control), each participating member cooperative receives current AECC system load data. This load data allows the member cooperatives to evaluate and determine when AECC summer peaks are imminent. Using this data, the member cooperatives control participating retail loads, thus reducing the member cooperative's contribution to AECC's summer peaks. The economic benefit to the member cooperatives is a reduced wholesale electric bill. This occurs because AECC's wholesale billing demand determinants are based on each member cooperative's contribution to AECC's summer peaks. Reductions in the member cooperative's wholesale demand charge allow the member cooperative to reduce its rates and charges to its participating retail consumers. Through various surveys, AECC has identified approximately 230 MW of potential member cooperative direct demand response within Category 1. This 230 MW is achieved through the installation of approximately 40,000 load control switches by ten member cooperatives. These switches are primarily installed on water pumping, air-conditioning, and water heating loads. AECC believes that these switches effectively remove approximately 120 MW from AECC's summer peaks. The difference between the 230 MW of installed Category 1 demand response and the approximate 120 MW of achieved demand response is primarily due to the necessary cycling of controlled loads during the summer peak periods.

**Category 2 - C&I Voluntary Peak Avoidance:**

In Category 2 demand response (C&I Voluntary Peak Avoidance), each participating member cooperative offers a rate incentive to participating C&I consumers. This incentive encourages the C&I consumer to voluntarily reduce its demand during periods when AECC summer peaks are imminent. Under Category 2 demand response, participating C&I consumers receive current demand data from AECC through the Internet. This information aids the
participating C&I consumer in evaluating their need to interrupt. The participating member cooperatives then use advanced metering to determine the participating C&I consumer’s demand at the time of AECC’s summer peaks. As with Category 1 demand response, AECC’s wholesale rates and charges are designed to provide the member cooperatives with a reduced wholesale bill when their C&I consumers reduce their on peak demand. The member cooperatives accordingly reduce the participating C&I consumer’s rates and charges. Currently, there are approximately 60 C&I consumers participating in Category 2 demand response. AECC conservatively estimates that approximately 95 MW of participating C&I demand is effectively reduced at the time of AECC’s summer peak periods.

**Effect of Combining Category 1 and 2 Demand Response on AECC’s Summer Peak Day Load Shape:**

Category 1 and 2 demand response programs (switch and voluntary C&I peak avoidance) have greatly flattened AECC’s summer peak day load shape(s). During AECC’s 2012 annual peak day, there were eight hours that fell within 95% of its firm peak hour (Graph 1). AECC estimates that without Category 1 and 2 demand response, only three hours would be within 95% of its peak hour.

The effect that Category 1 and 2 demand response has on AECC’s 2012 peak day load shape may be observed in Graph 2. The green bars in Graph 2 represent AECC’s actual 2012 peak day hourly load shapes. The red line represents an estimated peak day load shape if Category 1 and 2 demand response were not present.
Graph-1

AECC's Firm Load Peak Day kW by Hour 2012

Using direct load control and voluntary C&I demand response, the Electric Cooperatives have achieved a peak day load shape that is very flat having eight hours being within 95% of the peak hour.

The red line represents 96% of load at the time of AECC's peak hour.

AECC's Peak Hour

The graph shown below (Graph 3) illustrates the typical effect of Category 1 and 2 demand response on one member cooperative's actual twenty-four hour load shape. Using Category 1 and 2 demand response, this member cooperative dramatically reduced its load during the hours 1500 through 1900 CDST. These hours normally represent AECC's summer peak period.
Category 3 demand response represents the direct control by AECC of participating retail industrial consumers whose loads are five MW or greater. Under Category 3 demand response, nine retail industrial consumers have voluntarily agreed to receive service under a member cooperative's extension of AECC's Interruptible Credit Rider. These nine industrial consumers have a combined potential maximum demand of approximately 520 MW. Participating industrial consumers, receiving service under the Interruptible Credit Rider are assigned to certain interruptible capacity blocks. Each block may be interrupted for only a limited number of hours each year. So long as AECC does not exceed the number of hours stated in the interruptible blocks, AECC may interrupt an industrial consumer when such interruptions could prevent the interruption of firm load. In addition, half the number of hours stated in each interruption block may be interrupted by AECC for any reason, including but not limited to, fuel economics.

When interrupting participating industrial consumers, AECC attempts to lessen the impact of the interruption by locating and offering any “buy-through” energy that is available on the wholesale market. Buy-through energy is not supported by capacity and may be interrupted with five minutes notice. While
buy-through energy is typically priced at the incremental cost of fuel or purchased energy, buy-through energy offers the interrupted industrial consumer the option of paying the incremental market price or being interrupted.

**Total Impact of Category 1, 2, and 3 Demand Response:**

The following graph demonstrates Categories 1, 2, and 3 demand response, as a ratio of total system potential demand (the Electric Cooperatives' potential demand, both firm and interruptible).

**Impact on Long Term Capacity Needs and Reductions in Fixed Costs:**

The Electric Cooperatives' demand response programs currently allow AECC to avoid approximately 845 MW of generation peaking capacity. This number is derived from 735 MW of demand response plus an additional 110 MW of generating reserves (AECC targets a 15% reserve margin). While the region's capacity market is currently distressed and peaking capacity may be purchased for less than the cost of new construction, AECC's generation planning department estimates that the investment cost of newly constructed peaking capacity would be approximately $600 per kW. If AECC were to acquire 845 MW on additional peaking capacity at $600 per kW it would result in approximately $500 million of new investment along with its associated cost of ownership, operation, and maintenance. This number would not include any necessary
transmission investment to interconnect the capacity.

**Impact on the Cost of Energy:**

The Electric Cooperatives recently added a new feature to Category 3 demand response which allows AECC to interrupt up to one half of the number of hours stated in the interruptible blocks for any reason. By using these available hours to reduce AECC's load during times when the cost of fuel and purchased energy is greatest, AECC has avoided several million dollars in incremental fuel and purchased energy costs. This savings directly reduces the necessary collection of these costs under AECC's Fuel and Purchased Energy Rider (energy adder).

**Reliability:**

The use of demand response has successfully avoided capacity shortages on numerous occasions.

**Industrial Expansion and Growth:**

Demand response is essential in attracting and maintaining industry in the Electric Cooperatives' service territory. Of the nine industries currently participating in Category 3 demand response, seven were established after Category 3 demand response was made available.

**Future Innovation - Voltage Reduction and Automated Metering Infrastructure:**

In the past few years, one of AECC's member cooperatives has used the method of voltage reduction as a means to reduce peak demand. Southwest Arkansas Electric Cooperative Corporation ("Southwest") has had success with this technique and has effectively reduced their demand at the time of AECC's firm peak by approximately 1 MWV when applied to a portion of their system. Southwest might implement this method system wide in the near future. Ozarks Electric Cooperative Corporation has also had success with voltage reduction and has effectively reduced their demand at the time of AECC's firm peak by approximately 5 MW when applied to 17 of their stations. Carroll Electric Cooperative Corporation and Arkansas Valley Electric Cooperative Corporation also have plans to implement voltage reduction in the near future.

Currently, certain member cooperatives are exploring the advantages of Advanced Metering Infrastructure (AMI) systems and how these systems might be used to achieve more efficient demand response.
Attachment B
Energy Efficiency 2012 Program Summary

Keith Kaderly
Manager of Marketing/Energy Services
P.O. Box 848
Fayetteville AR 72702
Phone: 479-521-2900
Email: kkaderly2@ozarksecc.com
Residential Energy Efficiency Programs

• Model Home Program

In 2009 Ozarks Electric Cooperative Corp. (OECC) began a partnership with local builder Cobblestone Homes to build a energy efficient demonstration home. The program was continued in 2012 for the 4th consecutive year. This home was displayed during the Northwest AR parade of homes and in the course of a week 1,091 people visited the home. This home included technologies such as: Real time energy monitoring, high efficiency Heat Pump, Hybrid heat pump water heater, Triple level insulation (reflective, foam and cellulose), architecturally designed energy efficiency, and energy efficient lighting. (see attachment A1 for costs)

• Energy Efficiency Loans

These loans are designed to help promote the installation of energy efficient heat pumps through no money down fixed rate loans. Members can include any energy efficient upgrades to the home, these upgrades can include, but not limited to, water heaters, windows, insulation etc. These loans are a fixed term for 7 years and the interest rate usually ranges from 4.5%-7.5%. (see attachment A1)

• Doug Rye Energy Efficiency Seminars

Doug Rye has been a major part of our energy efficiency program for many years. His Saturday morning radio show is broadcast in over 28 states and he is a national spokesman for building energy efficient homes. OECC has based their energy efficient home building program around Mr. Rye’s approach to home building. OECC hosts energy efficiency seminars held by Mr. Rye once a year. (see attachment A1)

• Energy efficient presentations to local civic clubs

Each year OECC does several educational seminars to local civic clubs and organizations. These presentations are usually less then 45 minutes long and consist of energy saving tips. (see attachment A1)
• **Energy Efficient Marathon Water Heaters**

OECC is the only supplier, in our area, of Marathon water heaters. This high efficiency water heater has a lifetime warranty and is the most efficient electric water heater on the market. We sell these units at cost to our membership. In 2012 OECC distributed 52 energy efficient Marathon water heaters to our membership.

• **HVAC Load Calculations**

Detailed load calculations and proper sizing of heat pump equipment is vital to the proper function of energy efficient heat pumps. If the total heat gain/loss of a home is not correct, then the HVAC (Heating Ventilation and Air Conditioning) unit can be either over sized or undersized, both having major consequences on the comfort of the home. These two factors also influence the efficiency of the HVAC unit. We offer this service free of charge to our membership to encourage proper sizing of HVAC units. We have also offered load calculation training to HVAC dealers and other cooperatives across the state. (see attachment A1)

• **Complete Energy Audit (Blower Door Testing and Thermography study)**

OECC’s complete energy audit program is one of the first comprehensive energy audits offered by a utility. It utilizes blower door, duct blaster, theatrical fog and infrared testing equipment to determine heating and cooling lose in existing home structures. Using these testing technologies OECC’s energy auditor can diagnose structural deficiencies in a home or building that lead to high energy consumption. These technologies produce a tactile and visual reference to aid in the explanation of opportunities to save on home utility bills. An initial cost of the Complete Energy Audit is $100. Reimbursement will be made to the member upon presentation of paid receipts for energy improvements and will be limited to $100. With every energy audit completed free CFL’s are distributed to the member. (see attachment A1, A2, A4, A6)

• **Basic Energy Audit**

This free service is offered to any member that requests it. Our basic energy audit is simply a walk through of the home with general suggestions for obvious fixes to reduce energy usage. Typically this process is started because a member feels his/her bill is too high and wants help in reducing their overall usage. (see attachments A1 and A6)

• **LED lighting Projects**

In 2011/2012, OECC replaced the majority of the parking lot lights and all our T12 fluorescents with LED technology. We accomplished this through a state-funded
grant and by partnering with Next Gen Illumination, a local LED manufacturer. This program nearly eliminated all maintenance costs, reduced energy consumption, increased light levels and injected funds into a local business. The project was the first of its kind in Arkansas and once again displayed our commitment to environmental stewardship. Energy savings per year: 135,394 kWh

- **Chevrolet Volt - Extended Range Electric Vehicle**

  In 2012, Chevrolet released the Volt, a Plug-in Hybrid Electric Vehicle (PHEV). This vehicle utilizes electricity for the first 32-40 miles of use, reducing emissions and operating costs. The Volt is utilized for daily commute as a member education and demonstration program.

- **Electric Vehicle Charging Station**

  With the addition of the Chevrolet Volt to our fleet, we now offer a free-to-use charging station for our members who own electric vehicles.

**Demand Response Management**

- **Off Peak Rates**

  OEC has filed with the commission off peak rates that encourage the reduction of kW demand during peak times. These rates are designed for commercial and industrial accounts and have been very effective at reducing total system demand. (see attachment B1)
<table>
<thead>
<tr>
<th><strong>Energy Efficiency Loans</strong></th>
<th><strong>Civic Club Presentations</strong></th>
<th><strong>HVAC Load Calculations</strong></th>
<th><strong>Complete Energy Audit Costs</strong></th>
<th><strong>Basic Energy Audit Costs</strong></th>
<th><strong>Model Home Program</strong></th>
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</thead>
<tbody>
<tr>
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<td>8</td>
<td>Total # of Load Calculations</td>
<td>30</td>
<td>Total # of Audits</td>
<td>Promotion and Printing</td>
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<tr>
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<td>Average Total cost (wages and OH)</td>
<td>Wages and OH</td>
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<td>Wages and OH</td>
<td>$6,200.00</td>
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<td>Equipment costs</td>
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<td>total program cost '12</td>
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<tr>
<td></td>
<td>$13,561.78</td>
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</tr>
<tr>
<td><strong>Doug Rye Seminars</strong></td>
<td></td>
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<td></td>
<td>Model Home Program</td>
</tr>
<tr>
<td>Total promotion costs (advertising and Marathon give a way)</td>
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<td></td>
<td></td>
<td>Equipment costs</td>
<td>Promotion and Printing</td>
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<td>Wages and OH</td>
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<td></td>
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<tr>
<td></td>
<td>$1,500.00</td>
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<tr>
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<td>$1,621.08</td>
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<td>$6,389.60</td>
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<tr>
<td></td>
<td>$3,121.08</td>
<td></td>
<td></td>
<td>$4,359.60</td>
<td></td>
</tr>
<tr>
<td><strong>Complete Energy Audit Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total # of Audits</td>
<td>72</td>
<td>Total # of Audits</td>
<td>66</td>
<td>Total # of Audits</td>
<td></td>
</tr>
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<td>Wages and OH</td>
<td>$7,636.86</td>
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<tr>
<td>Equipment costs</td>
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<td>Total program cost '10</td>
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<td><strong>Relamping Of OECC Parking Lot</strong></td>
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<td>Total Cost</td>
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<td><strong>Total Expenditures for Energy Efficiency Programs '09</strong></td>
<td>$68,110.80</td>
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Energy Efficiency Loans
Total loaned in '12 $13,427.50
Wages and OH $134.28
Total program cost '12 $13,561.78

Doug Rye Seminars
Total promotion costs (advertising and Marathon give a way) $1,500.00
Wages and OH $1,621.08
Total # of Load Calculations 30
Wages and OH $4,359.60
Equipment costs $2,000.00
Total program cost '12 $13,561.78

Complete Energy Audit Costs
Total # of Audits 72
Wages and OH $14,040.00
Equipment costs $0.00
Total program cost '10 $14,112.00

Relamping Of OECC Parking Lot
Total Cost $7,800.00

Civic Club Presentations
Average Total cost (wages and OH) $1,162.56

HVAC Load Calculations
Total # of Load Calculations 30
Wages and OH $4,359.60
Equipment costs $2,000.00

Basic Energy Audit Costs
Total # of Audits 66
Wages and OH $7,636.86

Model Home Program
Promotion and Printing $6,200.00
Wages and OH $8,126.92

Total Expenditures for Energy Efficiency Programs '09 $68,110.80
Complete Energy Audit Program

1. Summary of program

OEEC’s complete energy audit program is one of the first comprehensive energy audits offered by a utility. It utilizes blower door, Duct Blaster, theatrical fog machine and infrared testing equipment to determine heating and cooling loss in existing home structures. Using these testing technologies OECC’s energy auditor can diagnose structural deficiencies in a home or building that lead to high energy consumption. These technologies utilizes a tactile and visual reference to aid in the explanation of opportunities to save on home utility bills. If we can identify areas that need improvement, and fixes can be easily explained to the member, the member can make a real difference in their usage. In turn, if the member reduces his/her demand for energy OECC will benefit from the demand reduction. This produces a win win situation for both the member and OECC. This test will cost the member $100 up front. Reimbursement of the initial cost of $100 will be made to the member upon presentation of paid receipts for energy improvements and will be limited to $100. A cost for the program allows the member to have vested interest in the program and will ensure areas that need improvement are fixed. The reimbursement process will verify that energy saving upgrades have been completed.

2. Qualifying members

- Must be a current member of Ozarks Electric.
- Member must live in the home.
- Member or designated person must be present for test. Audits will only be conducted from 9:00 a.m. – 2:00 p.m. Monday – Friday.
- Payment of $100 must be made to OECC before audit can be scheduled.
- Member may request a basic energy audit that does not include blower door testing and verification. This audit is free to the members.

Complete energy audit program process

1. Member requests energy audit.

2. CSR will determine if member would like a complete audit, basic audit or high bill complaint.

3. If the member decides they want a Complete Energy Audit then the member must be qualified for program.
4. Payment must be made over the phone via credit card at this time. If member would rather submit a check for this service they can do so, but they cannot be scheduled until payment is made.

5. Upon receipt of payment, e-mail is sent to James Reid jreid@ozarksecc.com with the members name, account number, and phone they can be reached at to schedule the test.

6. James Reid calls member to schedule appointment.

7. Test is completed leaving member with blower door test results and recommendations.

8. OECC receives forms and receipts - issues a bill credit for reimbursement up to $100.
Inspection Report

Report Date: 2/16/2010

Company: OECC
Address: P.O. Box 848 Fayetteville AR 72702
Thermographer: Keith Kaderly
kkaderly2@ozarksecc.com

Customer: Time 6:50 p.m.
Site Address: 379 Claybrook Dr.
Contact Person: Farmington AR 72730
Keith Kaderly

Image and Object Parameters

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Text Comments

Atmospheric Temp: 70.9°F
Relative Humidity: 50.0%
Time for Report: 2 hrs
ITC Course Date: 2/8/10 - 2/11/10

Description

Missing insulation in wall cavity estimated area to be 10.64 Sqr ft. If corrected from the current R 2.66 to the standard wall R 12.63 consumer could receive savings of approximately $9.28 per year.
Ozarks Electric Cooperative

Energy Audit Tracking Report

For audits during 2012

February, 2013

Compiled by Inside Information® Inc.
2012 TOTAL — Deemed Savings Analysis

Number of Efficiency Measures Recommended/Implemented

Total = 3,109 measures
2012 TOTAL — Deemed Savings Analysis

Potential kW Peak Demand Reduction to Co-op from EE Measures

Total = 203 kW
2012 TOTAL – Deemed Savings Analysis

Potential Annual Reduction in kWh Energy Use from EE Measures

Total = 1,359,576 kWh

<table>
<thead>
<tr>
<th>Year</th>
<th>kWh Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>199,126</td>
</tr>
<tr>
<td>2009</td>
<td>281,726</td>
</tr>
<tr>
<td>2010</td>
<td>361,732</td>
</tr>
<tr>
<td>2011</td>
<td>249,589</td>
</tr>
<tr>
<td>2012</td>
<td>267,403</td>
</tr>
</tbody>
</table>
2012 TOTAL — Deemed Savings Analysis

Potential Annual MMBTU Reduction from EE Measures

Total = 4,638 MMBTU

2008 2009 2010 2011 2012

2012 TOTAL – Deemed Savings Analysis

Potential Annual Cost Savings to Members from EE Measures

Total = $108,769

Based on kWh reduction at average $0.08/kWh
2012 TOTAL – Energy Audit Tracking

Homes with Audits Performed/Recommendations Provided

Total = 626 homes
2012 TOTAL – Energy Audit Tracking

Classification of Recommendations

More homes received recommendations regarding weatherization and HVAC

% of homes receiving recommendations in each category
2012 TOTAL – Energy Audit Tracking

Trends in Classification of Recommendations

Considerable increases in 2012 recommendations involving appliances, windows/doors

% of homes

- Weatherization
- HVAC
- Water heating
- Lighting
- Insulation
- Windows, doors
- Appliances

2010 2011 2012
2012 TOTAL – Energy Audit Tracking

Specific Energy Audit Recommendations

- Seal around pipes, elec, lights, etc: 54
- Seal around doors, windows: 50
- Repair or seal ductwork: 47
- Install CFLs: 45
- Install water heater insulation wrap: 36
- Add attic insulation: 35
- Change furnace or A/C filter: 35
- Insulate/seal around attic door/fan: 25
- Repair/install attic air vents: 22
- Service heat pump or central air: 16
- Upgrade to more efficient appliances: 14
- Install hot water pipe insulation: 14

Most 2012 recommendations involved weatherization, ductwork, CFLs
2012 Energy Audit and Deemed Savings Report
February, 2013

OVERVIEW

During 2012, Ozarks Electric Cooperative performed energy audits where recommendations were provided at the homes of at least 78 residential members, compared with 126 audits in 2011. The energy audit procedure includes conducting an on-site inventory of home and energy use characteristics, analyzing options, and providing recommendations for energy efficiency improvements.

AUDIT RECOMMENDATIONS

Recommendations for energy use improvements are divided into eight general categories. In total for 2012, there were 488 specific energy efficiency audit recommendations given to 78 member households, broken down as follows (note that most homes have more than one type of recommendation) –

<table>
<thead>
<tr>
<th>Category</th>
<th>Homes</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weatherization</td>
<td>54</td>
<td>69%</td>
</tr>
<tr>
<td>HVAC</td>
<td>53</td>
<td>68%</td>
</tr>
<tr>
<td>Lighting</td>
<td>45</td>
<td>58%</td>
</tr>
<tr>
<td>Water heating</td>
<td>45</td>
<td>58%</td>
</tr>
<tr>
<td>Insulation</td>
<td>40</td>
<td>51%</td>
</tr>
<tr>
<td>Windows/doors</td>
<td>18</td>
<td>23%</td>
</tr>
<tr>
<td>Appliances</td>
<td>17</td>
<td>22%</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>0</td>
<td>0%</td>
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</table>

DEEMED SAVINGS

Deemed savings analysis is based on data produced by Frontier Associates LLC, showing estimated kW and kWh impacts for specific efficiency improvements. Based on the analysis in the Frontier report, the following shows the estimated impacts of the 2012 efficiency improvement recommendations –

<table>
<thead>
<tr>
<th>Category</th>
<th>2012 Total</th>
<th>2011 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total potential/actual kW peak demand reduction to co-op</td>
<td>35.3 kW</td>
<td>40.1 kW</td>
</tr>
<tr>
<td>Total potential/actual annual kWh reduction to members</td>
<td>267,403 kWh</td>
<td>249,589 kWh</td>
</tr>
<tr>
<td>Total potential/actual annual energy cost savings to members ($0.08/kWh)</td>
<td>$21,392</td>
<td>$19,968</td>
</tr>
<tr>
<td>Total potential MMBTU reduction</td>
<td>912.5 MMBTU</td>
<td>851.7 MMBTU</td>
</tr>
</tbody>
</table>

The following shows the estimated and actual reduction in kWh usage and kW peak demand of the audit efficiency recommendations and water heater installations, as well as MMBTU reductions, by category –

<table>
<thead>
<tr>
<th>Category</th>
<th>2012 kWh</th>
<th>2011 kWh</th>
<th>MMBTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation</td>
<td>148,752</td>
<td>17.8</td>
<td>507.6 MMBTU</td>
</tr>
<tr>
<td>Weatherization</td>
<td>62,853</td>
<td>5.8</td>
<td>214.5</td>
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<tr>
<td>HVAC</td>
<td>38,199</td>
<td>8.8</td>
<td>130.4</td>
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<tr>
<td>Appliances</td>
<td>6,205</td>
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<td>21.2</td>
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<tr>
<td>Windows/doors</td>
<td>6,029</td>
<td>1.4</td>
<td>20.6</td>
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<tr>
<td>Water heating</td>
<td>3,880</td>
<td>0.5</td>
<td>13.2</td>
</tr>
<tr>
<td>Lighting</td>
<td>1,485</td>
<td>0.2</td>
<td>5.1</td>
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</tbody>
</table>

This report was developed by Inside Information® Inc., Smithville, Missouri, as part of a member database project commissioned by Ozarks Electric Cooperative, Fayetteville, Arkansas.
**ARKS ELECTRIC COOPERATIVE**

**2012 TOTAL Energy Efficiency Measures**

<table>
<thead>
<tr>
<th>Lighting</th>
<th>Amount of co-op measures recommended</th>
<th>Amount of co-op expenditures invested/yr</th>
<th>Total MMBTU impact from measures recommended or completed</th>
<th>Total potential annual kWh savings to consumers</th>
<th>Total potential kW peak demand reduction to co-op</th>
<th>Total potential annual deemed savings to consumers (@ $0.08/kWh)</th>
<th>Assumed annual kW peak demand reduction per household</th>
<th>Assumed kW peak demand reduction per household</th>
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</thead>
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<tr>
<td>Install compact fluorescent bulbs</td>
<td>45</td>
<td>$1,485</td>
<td>$0.180</td>
<td>$118.80</td>
<td>$0.000</td>
<td>$0.000</td>
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<td>Install LED lights</td>
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<td>$0</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
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<tr>
<td>Reduce operation of outdoor lights</td>
<td>0</td>
<td>$0</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
<tr>
<td>Use automatic dimmers/lighting controls</td>
<td>0</td>
<td>$0</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
</tbody>
</table>

**Total - Lighting (58% of homes)**

<table>
<thead>
<tr>
<th>Appliance</th>
<th>Amount of co-op measures recommended</th>
<th>Amount of co-op expenditures invested/yr</th>
<th>Total MMBTU impact from measures recommended or completed</th>
<th>Total potential annual kWh savings to consumers</th>
<th>Total potential kW peak demand reduction to co-op</th>
<th>Total potential annual deemed savings to consumers (@ $0.08/kWh)</th>
<th>Assumed annual kW peak demand reduction per household</th>
<th>Assumed kW peak demand reduction per household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install compact fluorescent bulbs</td>
<td>45</td>
<td>$1,485</td>
<td>$0.180</td>
<td>$118.80</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.004</td>
<td>$0.004</td>
</tr>
<tr>
<td>Install LED lights</td>
<td>0</td>
<td>$0</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
<tr>
<td>Reduce operation of outdoor lights</td>
<td>0</td>
<td>$0</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
<tr>
<td>Use automatic dimmers/lighting controls</td>
<td>0</td>
<td>$0</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
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</table>

**Total - Appliance Lighting (58% of homes)**

<table>
<thead>
<tr>
<th>Insulation</th>
<th>Amount of co-op measures recommended</th>
<th>Amount of co-op expenditures invested/yr</th>
<th>Total MMBTU impact from measures recommended or completed</th>
<th>Total potential annual kWh savings to consumers</th>
<th>Total potential kW peak demand reduction to co-op</th>
<th>Total potential annual deemed savings to consumers (@ $0.08/kWh)</th>
<th>Assumed annual kW peak demand reduction per household</th>
<th>Assumed kW peak demand reduction per household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add attic insulation</td>
<td>35</td>
<td>$277.57</td>
<td>$17.90</td>
<td>$6,507.20</td>
<td>$2,324</td>
<td>$0.486</td>
<td>$0.030</td>
<td>$0.030</td>
</tr>
<tr>
<td>Install insulation for floor, crawl space, trailer skirtirg</td>
<td>12</td>
<td>$193.44</td>
<td>$56,700</td>
<td>$0.000</td>
<td>$4,336.00</td>
<td>$4,725</td>
<td>$0.030</td>
<td>$0.030</td>
</tr>
<tr>
<td>Install, repair or replace vapor barrier</td>
<td>0</td>
<td>$0.00</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
<tr>
<td>Add or repair air insulation</td>
<td>4</td>
<td>$36.56</td>
<td>$0.792</td>
<td>$856.96</td>
<td>$2,678</td>
<td>$0.198</td>
<td>$0.010</td>
<td>$0.010</td>
</tr>
<tr>
<td>Insulate attic access door or around attic fan</td>
<td>25</td>
<td>$0.00</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
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</table>

**Total - Insulation (51% of homes)**

<table>
<thead>
<tr>
<th>Weatherization</th>
<th>Amount of co-op measures recommended</th>
<th>Amount of co-op expenditures invested/yr</th>
<th>Total MMBTU impact from measures recommended or completed</th>
<th>Total potential annual kWh savings to consumers</th>
<th>Total potential kW peak demand reduction to co-op</th>
<th>Total potential annual deemed savings to consumers (@ $0.08/kWh)</th>
<th>Assumed annual kW peak demand reduction per household</th>
<th>Assumed kW peak demand reduction per household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caulk or weatherstrip around doors or windows</td>
<td>50</td>
<td>$87.18</td>
<td>$35,900</td>
<td>$17.01</td>
<td>$6,507.20</td>
<td>$2,324</td>
<td>$0.486</td>
<td>$0.030</td>
</tr>
<tr>
<td>Seal pipes, attic fan vents, etc.</td>
<td>12</td>
<td>$94.10</td>
<td>$27,564</td>
<td>$2.568</td>
<td>$2,044.00</td>
<td>$511</td>
<td>$0.075</td>
<td>$0.000</td>
</tr>
<tr>
<td>Repair or install attic air-flow vents</td>
<td>22</td>
<td>$0.00</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
<tr>
<td>Close or repair fireplace damper/seat flue</td>
<td>9</td>
<td>$15.59</td>
<td>$4,536</td>
<td>$0.439</td>
<td>$1,207.52</td>
<td>$304</td>
<td>$0.045</td>
<td>$0.000</td>
</tr>
<tr>
<td>Repair holes in ceiling or exterior wall</td>
<td>9</td>
<td>$15.59</td>
<td>$4,536</td>
<td>$0.439</td>
<td>$1,207.52</td>
<td>$304</td>
<td>$0.045</td>
<td>$0.000</td>
</tr>
<tr>
<td>Repair leaky bathroom ventinstall new exhaust fan</td>
<td>1</td>
<td>$1.74</td>
<td>$511</td>
<td>$0.048</td>
<td>$40.88</td>
<td>$511</td>
<td>$0.000</td>
<td>$0.000</td>
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</table>

**Total - Weatherization (69% of homes)**

<table>
<thead>
<tr>
<th>Windows and Doors</th>
<th>Amount of co-op measures recommended</th>
<th>Amount of co-op expenditures invested/yr</th>
<th>Total MMBTU impact from measures recommended or completed</th>
<th>Total potential annual kWh savings to consumers</th>
<th>Total potential kW peak demand reduction to co-op</th>
<th>Total potential annual deemed savings to consumers (@ $0.08/kWh)</th>
<th>Assumed annual kW peak demand reduction per household</th>
<th>Assumed kW peak demand reduction per household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install new storm windows or upgrade windows</td>
<td>3</td>
<td>$20.57</td>
<td>$6,029</td>
<td>$1.447</td>
<td>$482.33</td>
<td>$2,010</td>
<td>$0.4824</td>
<td>$0.080</td>
</tr>
<tr>
<td>Install new insulated doors</td>
<td>9</td>
<td>$0.00</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
<tr>
<td>Adjust or repair broken windows or doors</td>
<td>6</td>
<td>$0.00</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
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</table>

**Total - Windows and Doors (23% of homes)**

<table>
<thead>
<tr>
<th>HVAC</th>
<th>Amount of co-op measures recommended</th>
<th>Amount of co-op expenditures invested/yr</th>
<th>Total MMBTU impact from measures recommended or completed</th>
<th>Total potential annual kWh savings to consumers</th>
<th>Total potential kW peak demand reduction to co-op</th>
<th>Total potential annual deemed savings to consumers (@ $0.08/kWh)</th>
<th>Assumed annual kW peak demand reduction per household</th>
<th>Assumed kW peak demand reduction per household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change furnace and A/C filter</td>
<td>35</td>
<td>$0.00</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
<tr>
<td>Repair, seal and close gaps in ductwork/return air</td>
<td>47</td>
<td>$48.75</td>
<td>$14,288</td>
<td>$1,763</td>
<td>$1,430.04</td>
<td>$394</td>
<td>$0.080</td>
<td>$0.000</td>
</tr>
<tr>
<td>Repair or service central air or heat pump</td>
<td>19</td>
<td>$23.70</td>
<td>$6,844</td>
<td>$3.360</td>
<td>$555.12</td>
<td>$434</td>
<td>$0.090</td>
<td>$0.000</td>
</tr>
<tr>
<td>Replace central air unit</td>
<td>0</td>
<td>$0.00</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
<tr>
<td>Replace or install new air-source heat pump</td>
<td>37</td>
<td>$67.55</td>
<td>$16,856</td>
<td>$3.000</td>
<td>$1,348.48</td>
<td>$2,107</td>
<td>$0.450</td>
<td>$0.000</td>
</tr>
<tr>
<td>Install air/heat pump</td>
<td>0</td>
<td>$0.00</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
<tr>
<td>Replace window A/C with high-efficiency window units</td>
<td>1</td>
<td>$0.38</td>
<td>$111</td>
<td>$0.085</td>
<td>$8.88</td>
<td>$111</td>
<td>$0.015</td>
<td>$0.000</td>
</tr>
<tr>
<td>Install or use ceiling fans</td>
<td>0</td>
<td>$0.00</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
<tr>
<td>Install programmable thermostat</td>
<td>2</td>
<td>$0.00</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
<tr>
<td>Adjust humidistat settings (lower winter, higher summer)</td>
<td>0</td>
<td>$0.00</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
</tbody>
</table>
## Ozarks Electric Cooperative Energy Audit Trends


<table>
<thead>
<tr>
<th>Type of Efficiency Recommendation (% of homes)</th>
<th>n=122</th>
<th>n=90</th>
<th>n=110</th>
<th>n=86</th>
<th>n=78</th>
<th>AVG</th>
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<tbody>
<tr>
<td>Lighting</td>
<td>2008</td>
<td>2009</td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
<td>TOTAL</td>
</tr>
<tr>
<td>Appliances</td>
<td>16%</td>
<td>80%</td>
<td>55%</td>
<td>73%</td>
<td>58%</td>
<td>56%</td>
</tr>
<tr>
<td>Insulation</td>
<td>5%</td>
<td>3%</td>
<td>1%</td>
<td>2%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Weatherization</td>
<td>24%</td>
<td>85%</td>
<td>77%</td>
<td>83%</td>
<td>69%</td>
<td>68%</td>
</tr>
<tr>
<td>Windows and doors</td>
<td>25%</td>
<td>7%</td>
<td>5%</td>
<td>7%</td>
<td>23%</td>
<td>13%</td>
</tr>
<tr>
<td>HVAC</td>
<td>66%</td>
<td>83%</td>
<td>55%</td>
<td>87%</td>
<td>68%</td>
<td>72%</td>
</tr>
<tr>
<td>Water heating</td>
<td>19%</td>
<td>55%</td>
<td>45%</td>
<td>66%</td>
<td>58%</td>
<td>49%</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>18%</td>
<td>2%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MMBTU Impact from Measures Recommended/Completed</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>2.1</td>
<td>33.0</td>
<td>122.8</td>
<td>7.0</td>
<td>5.1</td>
<td>170.1</td>
</tr>
<tr>
<td>Appliances</td>
<td>8.5</td>
<td>0.0</td>
<td>0.0</td>
<td>5.8</td>
<td>21.2</td>
<td>35.3</td>
</tr>
<tr>
<td>Insulation</td>
<td>436.0</td>
<td>562.1</td>
<td>574.3</td>
<td>435.5</td>
<td>507.6</td>
<td>2515.4</td>
</tr>
<tr>
<td>Weatherization</td>
<td>65.6</td>
<td>143.6</td>
<td>307.6</td>
<td>218.0</td>
<td>214.5</td>
<td>949.3</td>
</tr>
<tr>
<td>Windows and doors</td>
<td>46.0</td>
<td>0.0</td>
<td>0.0</td>
<td>27.4</td>
<td>20.6</td>
<td>94.0</td>
</tr>
<tr>
<td>HVAC</td>
<td>113.3</td>
<td>161.4</td>
<td>158.9</td>
<td>109.5</td>
<td>139.4</td>
<td>673.6</td>
</tr>
<tr>
<td>Water heating</td>
<td>8.0</td>
<td>61.2</td>
<td>70.7</td>
<td>48.6</td>
<td>13.2</td>
<td>201.7</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>679.5</td>
<td>961.3</td>
<td>1234.3</td>
<td>851.7</td>
<td>912.6</td>
<td>4639.4</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>KW Impact from Measures Recommended/Completed</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>0.08</td>
<td>1.18</td>
<td>4.39</td>
<td>0.25</td>
<td>0.18</td>
<td>5.07</td>
</tr>
<tr>
<td>Appliances</td>
<td>0.35</td>
<td>0.00</td>
<td>0.00</td>
<td>0.23</td>
<td>0.41</td>
<td>1.39</td>
</tr>
<tr>
<td>Insulation</td>
<td>20.92</td>
<td>25.78</td>
<td>33.73</td>
<td>24.52</td>
<td>17.80</td>
<td>122.74</td>
</tr>
<tr>
<td>Weatherization</td>
<td>3.26</td>
<td>5.77</td>
<td>6.93</td>
<td>5.94</td>
<td>5.35</td>
<td>28.75</td>
</tr>
<tr>
<td>Windows and doors</td>
<td>2.78</td>
<td>0.00</td>
<td>0.00</td>
<td>1.93</td>
<td>1.45</td>
<td>6.16</td>
</tr>
<tr>
<td>HVAC</td>
<td>6.24</td>
<td>5.68</td>
<td>5.85</td>
<td>0.07</td>
<td>8.31</td>
<td>32.64</td>
</tr>
<tr>
<td>Water heating</td>
<td>0.19</td>
<td>1.43</td>
<td>1.65</td>
<td>1.13</td>
<td>0.45</td>
<td>4.84</td>
</tr>
<tr>
<td>Miscellaneous</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Total</td>
<td>33.8</td>
<td>40.8</td>
<td>52.5</td>
<td>40.1</td>
<td>35.4</td>
<td>202.59</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KWh Impact from Measures Recommended/Completed</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>627</td>
<td>9,685</td>
<td>35,597</td>
<td>2,046</td>
<td>1,485</td>
<td>49,840</td>
</tr>
<tr>
<td>Appliances</td>
<td>2,481</td>
<td>0</td>
<td>1,654</td>
<td>6,205</td>
<td>10,340</td>
<td></td>
</tr>
<tr>
<td>Insulation</td>
<td>127,770</td>
<td>184,733</td>
<td>168,265</td>
<td>127,820</td>
<td>148,752</td>
<td>737,164</td>
</tr>
<tr>
<td>Weatherization</td>
<td>19,232</td>
<td>42,070</td>
<td>90,150</td>
<td>63,875</td>
<td>62,853</td>
<td>278,180</td>
</tr>
<tr>
<td>Windows and doors</td>
<td>13,480</td>
<td>0</td>
<td>0</td>
<td>6,029</td>
<td>6,029</td>
<td>27,548</td>
</tr>
<tr>
<td>HVAC</td>
<td>33,102</td>
<td>47,294</td>
<td>46,576</td>
<td>32,119</td>
<td>38,199</td>
<td>197,580</td>
</tr>
<tr>
<td>Water heating</td>
<td>2,344</td>
<td>11,944</td>
<td>20,720</td>
<td>14,236</td>
<td>5,800</td>
<td>58,124</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>199,126</td>
<td>281,726</td>
<td>361,732</td>
<td>249,589</td>
<td>267,403</td>
<td>1,359,576</td>
</tr>
<tr>
<td>Measures Recommended/Completed</td>
<td>2008</td>
<td>2009</td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
<td>TOTAL</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>Lighting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Install compact fluorescent bulbs</td>
<td>19</td>
<td>45</td>
<td>159</td>
<td>62</td>
<td>45</td>
<td>330</td>
</tr>
<tr>
<td>Install LED lights</td>
<td>0</td>
<td>200</td>
<td>750</td>
<td>16,000</td>
<td>78</td>
<td>17,028</td>
</tr>
<tr>
<td>Inspect recessed light fixtures</td>
<td>0</td>
<td>3</td>
<td>10</td>
<td>2</td>
<td>0</td>
<td>15</td>
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<tr>
<td>Reduce operation of heat lamps</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td><strong>Appliances</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace refrigerator/freezer with Energy Star model</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>10</td>
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<tr>
<td>Upgrade general appliances to Energy Star models</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>14</td>
<td>16</td>
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<tr>
<td>Seal around refrigerator door</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Turn down waterbed heater thermostat</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Clean refrigerator coils</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td><strong>Insulation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add attic insulation</td>
<td>36</td>
<td>45</td>
<td>62</td>
<td>48</td>
<td>35</td>
<td>226</td>
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<tr>
<td>Add or repair wall insulation</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>6</td>
<td>4</td>
<td>23</td>
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<tr>
<td>Install insulation for floor, crawl space, trailer skirt</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>12</td>
<td>19</td>
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<tr>
<td>Insulate around attic access door/attic fan</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>33</td>
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<td><strong>Weatherization</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caulk or weatherstrip around doors or windows</td>
<td>24</td>
<td>43</td>
<td>76</td>
<td>62</td>
<td>50</td>
<td>255</td>
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<tr>
<td>Seal pipes, attic fan, vents, lights, baseboard, etc.</td>
<td>13</td>
<td>21</td>
<td>73</td>
<td>52</td>
<td>54</td>
<td>213</td>
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<tr>
<td>Close or repair fireplace dampers/seal flue</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>9</td>
<td>9</td>
<td>21</td>
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<tr>
<td>Repair holes in ceiling/ exterior wall</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Repair leaky bathroom vent/install new exhaust fan</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Close off or seal crawl space</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Repair/install attic air-flow vents</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>22</td>
<td>24</td>
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### Ozarks Electric Cooperative Energy Audit Trends


<table>
<thead>
<tr>
<th>Measures Recommended/Completed</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td><strong>Windows and doors</strong></td>
<td></td>
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<tr>
<td>Install new storm windows/upgrade windows</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
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<td>Install new insulated doors</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>2</td>
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<tr>
<td>Adjust or repair broken windows or doors</td>
<td>26</td>
<td>4</td>
<td>6</td>
<td>2</td>
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<tr>
<td><strong>HVAC</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Repair, seal, close gaps in ductwork/return air</td>
<td>29</td>
<td>31</td>
<td>29</td>
<td>50</td>
<td>47</td>
<td>186</td>
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<tr>
<td>Change furnace/AC/ductwork filter</td>
<td>19</td>
<td>23</td>
<td>19</td>
<td>22</td>
<td>35</td>
<td>116</td>
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<tr>
<td>Replace or install new air-source heat pump or central air unit</td>
<td>28</td>
<td>11</td>
<td>10</td>
<td>7</td>
<td>8</td>
<td>64</td>
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<tr>
<td>Repair or service central air or air-source heat pump</td>
<td>18</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>16</td>
<td>42</td>
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<tr>
<td>Remove obstructions to inside HVAC vents/add return air</td>
<td>1</td>
<td>0</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>16</td>
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<tr>
<td>Remove obstructions to outside HP/CA unit airflow</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Don't use fireplace and central heating at same time</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Adjust HVAC thermostat settings/install programmable thermostat</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
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<tr>
<td>Install or use ceiling fans</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<tr>
<td><strong>Water heating</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Install more efficient water heater</td>
<td>9</td>
<td>89</td>
<td>97</td>
<td>55</td>
<td>3</td>
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<tr>
<td>Install water heater insulation wrap/blanket</td>
<td>10</td>
<td>30</td>
<td>48</td>
<td>53</td>
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<td>177</td>
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<td>Turn down WH thermostat/add timer to thermostat</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>20</td>
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<tr>
<td>Service/repair/replace water heater element</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>8</td>
<td>10</td>
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<tr>
<td>Repair leaks in water heater tank or pipes</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
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<td><strong>Miscellaneous</strong></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Reduce use/add timers on pool/hot tub/garden water pumps</td>
<td>14</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>15</td>
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<tr>
<td>Repair/replace/turn off breaker to water well pump</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Recommend general conservation and full home energy audit</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
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<tr>
<td>Check electric meter and wiring</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
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Southwest Arkansas Electric Cooperative Corporation

Docket No. 08-042-RP
Southwest Arkansas Electric Cooperative Corporation  
Texarkana, Arkansas

2012 Energy Efficiency and Conservation Report  
Submitted to the Arkansas Public Service Commission  
Pursuant to Docket No. 06-004-R

Southwest Arkansas Electric Cooperative Corporation is a non-profit, member-owned utility organized under the Arkansas Electric Cooperative Corporation Act. Since its incorporation on August 25, 1937, Southwest Arkansas Electric Cooperative remains dedicated to providing affordable and reliable electric service at valued rates to its membership while promoting and encouraging energy efficiency and energy conservation in its service area. Its service territory includes portions of Columbia, Hempstead, Howard, Lafayette, Little River, Miller, Polk and Sevier counties in southwest Arkansas; part of Bowie County in northeast Texas and McCurtain County in southeast Oklahoma.

The terrain of Southwest’s service area varies considerably from low flat farmland in the south to rolling hills in the north. Land elevations range from 200 to 2000 feet above sea level. Land use within the Cooperative’s service area is very diversified. The rolling hills in the north invite truck farming, plus lumber, dairy and poultry operations. In the south, the rich flat farmlands produce cotton, rice, soybeans, hay and corn. The cattle industry is also prominent throughout the service area.

The Cooperative provides service to approximately 18,428 member consumers through approximately 27,639 separately metered points of delivery, through 5,404 miles of overhead and underground distribution line, 134 miles of 69 kV transmission line and 32 substations. The total power requirements are supplied at wholesale by Arkansas Electric Cooperative Corporation, Little Rock, Arkansas, a generation and transmission cooperative that is partially owned by Southwest Arkansas Electric Cooperative.

Southwest Arkansas Electric Cooperative Membership Education and Programs

- Provides Arkansas Living, a monthly publication that furnishes members current news concerning national and state issues relative to the electric power industry. Also, the Arkansas Living magazine affords the opportunity each month to give energy efficiency and energy conservation information to members.

- Provides educational information at the front counter and upon request, free of charge, to any interested person.

- Provides energy efficient electric ranges to area high school home economics classes, as needed.
• Provides billing inserts several times a year that gives information about current topics and information on energy efficiency and conservation.

• Provides free educational material to area schools that targets energy conservation and safety. Annually, Cooperative personnel visit area schools to teach both energy conservation and electrical safety. Scott Davis, Cooperative magician, presented Making Accidents Disappear public safety magic shows to 19 schools in the Southwest Arkansas Electric Cooperative service area reaching approximately 3,150 students. Making Accidents Disappear is an educational and entertaining program that teaches children the importance of electrical safety. The 40-minute school assembly program uses audience participation, comedy, stories, and magic to communicate the importance of behaving safely around electricity.

• Provides print and radio advertising that emphasizes important member and public safety information.

• Provides safety presentations to first responder emergency personnel, firemen, state troopers, local police officers and emergency services personnel in its service area on electrical safety that included topics such as overhead power lines; what to do in the event of a downed power line on a vehicle; downed power lines in the field; power line safety; substation and transformer emergencies; and recognizing the dangers of pulling meters during fire events that may have been tampered with prior to the fire event. These presentations also emphasized electrical safety and hazard recognition for all emergency services personnel.

• Provides the Washington, D.C./NRECA Youth Tour to one or two area high school juniors each year. This program sends participants to Washington, D.C. and combines education, history, and fun for the youths as they visit our Nation’s Capitol. In addition to visiting the Capitol and learning about the National Rural Electric Cooperative program, the participants expand their knowledge of energy efficiency, energy conservation, the history of rural electrification and current issues.

• Provides directors and employees the opportunity to attend the annual NRECA Legislative Conference in Washington, D.C. to participate in legislative forums about current issues involving the electricity industry and to meet with the Arkansas Congressional Delegation.

• Provides seminars by Doug Rye, a consultant for the Electric Cooperatives of Arkansas. Mr. Rye hosts a nationally syndicated radio show that promotes energy efficiency and energy conservation. Also, Mr. Rye provides energy efficiency and energy conservation tips monthly in the *Arkansas Living* magazine.

• Provides a website, [www.swrea.com](http://www.swrea.com), with Facebook access that includes information on energy efficiency and conservation. Also, the website includes
links to the Touchstone Energy Savers Efficient House, the Touchstone Energy Kid Zone and the U.S. Department of Energy website.

- Provides a CEO to Member Email Program. This tool is designed to help cooperative CEOs effectively communicate with members about issues affecting the cost of electricity. Southwest Arkansas Electric Cooperative currently has approximately 4,450 email addresses of member-consumers.

- Provides sponsorship of the Texarkana HVACR Association. The chapter consists of local heat and air conditioning contractors that meet monthly except during the summer season. The Association reviews new products and procedures and keeps their membership up-to-date on state requirements and rule changes. The Association sponsors seminars that promote energy savings equipment such as energy efficient ceiling ducts and new insulation material and techniques.

- Provides an electrical safety training demonstration. This safety demonstration is given to schools, rural fire departments and other emergency agencies.

- Provides a web based residential energy audit at no charge through www.swrea.com.

- Provides information to members on the benefits of energy efficient water heaters. Marathon water heaters are offered to the membership at discounted prices.

- Provides education material to new members as a part of the new member packet.

- Provides print and radio advertisements to promote energy efficiency and energy conservation.

- Provides an industrial power service optional rate schedule that allows voluntary peak avoidance to industrial and commercial users to control or shed their peak kW usage in order to avoid kW coincident demand. The users can accomplish this by various means including the shifting of the production schedule during the summer, installing distributed generation or a combination of the two. Presently, Southwest Arkansas Electric has one commercial and three industrial consumers that are using this option.

- Provides annual inspection of the electric system to look for safety hazards and idle services, transformers or lines. The retirement of idle services, transformers or lines reduces line loss on the system.

- Provides a yearly work plan and budget for system right-of-way clearing. Clear rights-of-way improve service and reduces line loss on the system.
• Provides capacitors on distribution lines and substations to maintain a minimum of 98 percent power factor. This high power factor improves system efficiency and reduces line loss on the system.

• Provides supervisory control and data acquisition (SCADA) to many of its substations. SCADA improves service to the members while improving system efficiency and reduces line loss on the system.

• Provides, on an experimental basis, conservation voltage reduction in selected substations. The Cooperative is attempting to lower voltage on peak to reduce demand, energy and losses. The program requires the use of SCADA, AMS and correct placement of capacitors.

• Provides, in 2013, an Advanced Meter System that will improve service and improve system efficiency. The AMS will provide two way communications and will monitor, at each meter location, voltage, blinks, outages, KW and power factor. Line loss will also be reduced on the system.

• Provide, in 2013, a pre-pay electric program to consumers. The program improves service and encourages energy conservation.

• Provides infrared inspection of lines and substations to improve service and reduces line loss on the system.

• Provides for the replacement of mercury vapor outdoor lighting with high pressure sodium outdoor lighting to reduce line loss on the system.

• Provides trained staking engineers in the designing of system line extensions to correctly size conductor and transformers to reduce line loss on the system.

• Provides for the purchase of low loss transformers to reduce line loss on the system.

• Provides administrative assistance and energy conservation tips when analyzing high bill complaints. In the future, the consumer will be able to monitor hourly usage through installed applications on smartphones and tablets.

Southwest Arkansas Electric Cooperative Energy Resource Conservation Loans (ERC)

• Provides information on energy efficient heat pumps and water heaters.

• Provides the Energy Resources Conservation loan program. Employees work with members on installing energy efficient heat pumps and water heaters using 5% financing through the ERC loan program. Since 1991, a total of $5.9 million has been loaned to 1,156 members. There are currently 191 loans outstanding with a
balance of $610,023. This program has provided affordable financing to many of its members who otherwise would not have been able to afford the energy saving improvements.

- Provides energy efficient Marathon hot water heaters with available financing to members. This water heater is 97% efficient and guaranteed for life.

- Provides financing for the purchase of small standby generators for home and commercial use. There has been $349 thousand loaned to 433 members. There are no outstanding loans at this time.

- Provides financing for energy efficient doors and windows through the ERC loan program.

- Provides financing for the installation of insulation material on existing homes through the ERC loan program.

**Energy Efficiency and Conservation in Association with the Electric Cooperatives of Arkansas**

- Provides promotional assistance and participates through AECC in an energy efficiency educational program titled “Extreme Energy Inefficient Home Makeover.” This program is designed to highlight the benefits of installing energy efficient equipment and materials in order to maximize energy conservation.

- Provides assistance and participates through AECC in the Arkansas Energy offices statewide Arkansas Energy Efficiency Education Program. The program is designed to utilize various media platforms to present information on energy efficiency and energy conservation. In January 2008, the Electric Cooperatives of Arkansas contributed approximately $279,340 to the EEA program and made additional voluntary payments of $246,784 and $95,605 in January 2009 and 2010, respectively. In April 2011 and 2012, the Electric Cooperatives of Arkansas paid $112,463 and $139,215, respectively, for EEA program expenses.

- Provides assistance and participated through AECC in the initial Deemed Savings Report that was filed with the APSC in April 2007. The contribution to this report was approximately $12,085. In addition, the Electric Cooperatives of Arkansas contributed $17,307 and $27,572, respectively, for the 2011 and 2012 Deemed Savings Report.

- Provides assistance through AECC with contributions to the Arkansas Home Builders Association for conducting “Energy Code” classes to enhance the understanding of Arkansas home builders with regard to applicable efficiency codes.
From October 2007 through December 2007, provided assistance and participated through AECC in programs in 2007 with the Arkansas Community Action Agencies by funding approximately $28,500 and funded an additional amount of $114,000 per year in 2008 and 2009 for an Electric Cooperative Weatherization Program. When ACAA develops a statewide weatherization program, the Electric Cooperatives of Arkansas will reconsider weatherization program support.

- Provides assistance and sponsors through AECC Doug Rye’s nationally syndicated radio program “Home Remedies.”

- Provides assistance and participates through AECC in the Arkansas Public Service Commission Energy Efficiency collaborative. In the past, the Electric Cooperatives of Arkansas participated in a collaborative discussing energy efficiency reporting for investor owned utilities. Also, the Electric Cooperatives of Arkansas participated in a series of APSC sponsored teleconferences regarding National Action Plan for Energy Efficiency (NAPEE) “best practices.”

Conclusion

Southwest Arkansas Electric is committed to its strategic vision that includes providing information and education on energy efficiency and energy conservation. The Cooperative will also provide programs and services that promote both energy efficiency and energy conservation.

C. Wayne Whitaker, President and CEO
Petit Jean Electric Cooperative Corporation

Docket No. 08-043-RP
Petit Jean Electric Cooperative Corporation

2012 Energy Efficiency Report

Petit Jean Electric continues to provide its members with programs and information that will help them understand and reduce their energy consumption. Residential and commercial energy audits help members identify energy wasting problems with building envelopes and electrical equipment in and around their home or business. Employees continue to receive training on use of blower door test equipment, infrared imaging equipment and power monitors for this purpose. We provide energy efficiency tips through radio ads, Doug Rye seminars, website referrals, presentations through Human Services programs and through direct contact. Members also receive the Rural Arkansas Living magazine that has tips on energy efficiency as well as information on public issues that affect them. Installation of TWACS meters allow Member Service Representatives to help members with questions they may have about usage that shows up on their light bill. We have added a lobby display that allows members to compare wattages of incandescent, CFL, and LED bulbs that are commonly available. Level II thermal imaging training and a 3 phase power monitor has been budgeted for 2013. These are rather expensive for a small Coop but will help better serve our members.

We have so far provided these services at no extra cost to our members and plan to continue these programs in the future.
Petit Jean Electric Cooperative Corporation

Energy Efficiency Expenditures 2012

Training and Seminars

Member Service Meetings $200
Level one IR Building Investigations $500
Travel Expense $470
Hours $2,575
$3,745

Presentations and Events

County Fairs (material and hours) $2,200
Doug Rye $197
Human Services (energy incentive program) $580
$2,977

Customer Assistance (High bills, audits, and direct contact) $20,100

Arkansas Living Magazine $42,000

Website Expenses $9,000

Radio and newspaper energy efficiency and safety tips $8,804

Total expenses for energy efficiency related programs 2012 $86,626
The TWACS metering system is proving to be a valuable tool that gives members a more detailed look at their energy usage that shows them the value of energy efficiency especially during extremely cold and warm weather conditions. Audits help identify areas where improvements can be made to help reduce energy costs for members. With help from Arkansas Electric Cooperative our members now have access to "Home Energy Suite" on our website that allows them evaluate their energy usage. These programs help members become more informed about energy efficiency so they can make better decisions that affect their energy usage.
### Petit Jean Electric Tip of the Week

#### Willie Wirehand

**Lineman**

August marks the beginning of a new school year. Watch out for children in school zones and those waiting at bus stops. Passing a bus that is stopped to pick up or drop off kids can have serious consequences. Always be on the lookout for kids that walk to school and slow down at crosswalks. Try leaving a little earlier to avoid bus traffic so you won't be late for work or appointments. Avoid cell phone use and other distractions while driving during the school year.

#### Debbie Little

**Operations Assistant**

Ground source or geothermal heat pumps use the earth instead of the air to transfer heat to or from your home. By circulating a solution of water and antifreeze through pipes buried in the ground, the system uses soil that is about 50 degrees year round to heat or cool your home instead of air that might be 20 degrees in the winter or 80 degrees in the summer. Install an energy efficient heat pump and save.

#### Van Bowling

**Lineman Foreman**

Knowing what to do in an emergency situation can mean the difference between life and death for someone. When faced with an emergency most people don't act because they are unsure of what to do. Taking a first aid course is one way to gain some basic knowledge for treating an injured victim. Take the time to learn CPR and other first aid procedures.

#### Phillip Burgess

**Vegetation Control**

What's using your power? On the average utility bill, 56% of your home energy cost went for heating and cooling, 25% was used for refrigeration, 23% was used for lighting and appliances and the other 10% was used for water heating. Implementing a few energy saving measures in each of these areas can help reduce energy cost.

#### Sherry Bettis

**Accounting Mgr.**

Contact your local electric utility before cutting, pruning, or trimming trees that are near overhead power lines. One small puff of wind or miscut limb can cause you severe injury or death, not to mention the damage it can cause to power lines and equipment. One phone call could save a lot of time, money, and embarrassment as well as your life. Be smart, call before you cut or trim your trees.

#### Dale King

**Lineman Foreman**

Water and electricity don't mix. Keep electrical appliances and equipment away from water and wet areas. Hair dryers, curling irons and other household appliances should not be used where they can fall into sinks, tubs or toilets. Installing GFCI plug-ins and breakers may be required if appliances will be used near water or wet areas. Read and follow safety instructions listed in owner's manual before using any appliance.

#### Grady Emerson

**Vegetation Control**

When choosing insulation for a new home, price is not the only thing to consider. With so many types of insulation that can be applied in many different ways selection can be difficult. Paying a little more for better insulating material can help cut future energy cost and will improve the comfort level of your home. Insulation is a small expense that can make a big difference in utility bills each month.

#### Dwight Lankford

**Transportation Dept.**

Windows add to the beauty of a home and they provide a view to the outside. But keep in mind they can also be a home's largest source of energy loss. In an energy-efficient home the glass area should be kept to 10% or less of the total wall area. New or replacement windows should at least be double-pane and have low-E glass. Wood or vinyl frames are more energy efficient than metal framed windows.

#### J B Story

**Engineering Dept.**

Water heaters placed in basements or under houses where they are out of the way can also put them out of mind. Periodically check your water heater for signs of leaks or corrosion. Wrapping your electric water heater with an insulating blanket will help reduce your water heating cost. Remember a leaking or poorly insulated water heater can cost you money.

#### Josh Baker

**Lead Lineman**

Extension cords are designed for temporary use only. Never put a cord under a rug or furniture that can cause it to overheat or become damaged. Over loading a cord with too many appliances can cause the cord to fail and it increases the risk of fire. Make sure your extension cords are in good physical condition and are designed for the work it is being used.
North Arkansas Electric Cooperative, Incorporated

Docket No. 08-044-RP
2012 Energy Efficiency and Conservation Efforts

Cooperative Philosophy on the Efficient Use of Energy.

North Arkansas Electric Cooperative has always tried to do what is in the best interest of the member, which includes promoting energy efficiency when possible. The co-op's initial focus for its energy efficiency efforts was on helping the individual member obtain direct savings in electrical usage by installing energy efficiency measures that would have an immediate impact on their monthly bill. Because North Arkansas Electric is a cooperative with the mission of benefiting its members, in contrast to detached stockholders, energy efficiency promotions that cut kilowatt-hour sales benefit the member directly by saving them money.

A secondary benefit of NAEC promoting energy efficiency is the avoidance or delay of new power plant construction. This also results in a savings to the member-consumer, but has a long-term benefit in the form of holding down rates that would pay for the capital investment required for a new power plant.

Delaying or avoiding capital investment in new power plants can also be achieved by shifting electrical consumption to off-peak periods. North Arkansas Electric has been very successful in this area with its Load Management program and Energy Resource Conservation Loan program. These programs allow for much more efficient allocation of generation assets, thus delaying rate increases that usually accompany power plant construction.

Marathon Water Heater Lease Program (See Attachment Leases)

The Marathon Sheet detailing the monthly savings at the bottom shows what an average member would save per month if they installed a high efficiency Marathon Water Heater. When computing the figures we used our kWh charge of $0.079. The $5.38 average monthly savings was used to total the amount saved by our members who utilize our Marathon Lease
Program. In 2012, we leased 202 water heaters. The total year end savings for our members equaled $7,655.74.

The controlled peak from these installations equated to 181.8 kW. This figure was computed by taking the number of water heaters leased times their wattage, then multiplying that number by 20 percent, which is the estimating operating time.

*No labor or overhead was used in these figures.

**Energy Resource Conservation (ERC) Loan Program – Heat Pumps**

North Arkansas Electric Cooperative is among some of the leading electric distribution cooperatives across that nation that provides low interest money for energy efficiency improvements to its members through a program called Energy Resource Conservation. This program is offered through the Rural Utilities Service. Over the past twenty-seven years, NAEC has loaned out approximately $11,552,988 million dollars to approximately 2,800 members who were/are in need of replacing an outdated/inefficient heating and cooling system.

During 2012 NAEC processed 64 loans for its members through the ERC program. For the purpose of this Energy Efficiency report, we computed the Total Annual Dollar Savings and Total Annual kWh Saved based on the cooperative’s own calculations. Additionally, we calculated the Total kW Demand and Total Annual kWh savings based on the Frontier Deemed Savings for Zone 8 and Zone 9.

**NAEC Evaluation Based on SEER Savings Chart (See Attachment NAEC ERC)**

Energy advisors within the cooperative compiled a chart detailing the estimated dollar savings per ton based on the existing SEER and new SEER of the location’s heating and cooling system. From this we calculated a dollar savings of $19,817 to our members. Additionally a Total Annual kWh Savings was calculated at 250,943.

**Frontier Deemed Savings Guide (See Attachment Frontier)**

The areas served by NAEC fall under Zone 8 and Zone 9 in the Frontier Report. According to the Frontier Deemed Savings Guide, NAEC’s ERC Loan program saved our members 127,819 kWhs. Additionally, 20 kW was saved as well.

*Labor and overhead put toward this program was not included in the figures listed above.

**NAEC Energy Audits (See Attachment Energy Audits)**

North Arkansas Electric Cooperative employs three full time energy advisors. During the 2012 year, these three employees conducted 84 energy audits for NAEC members. These audits were provided at no charge. A log of hours and mileage spent on each audit was completed.
The 84 audits resulted in 2,156 miles at a rate of $0.55 and 165.50 hours of labor conducting the actual audit at a rate of $25 per hour. In all, energy audits contributed $5,323.58 toward energy efficiency efforts in 2012.

**Rate 1017** *(See Attachment Rate 1017)*

Cooperative personnel visited with approximately 27 account holders who were being transferred to the 10-17 (off peak) rate to explain how the rate worked and discuss opportunities to help them keep their demand down. At that time, members were offered an opportunity to receive courtesy calls/texts during peak usage times as a reminder to keep usage to a minimum. As such a total kW savings of 2,154 has been calculated for the rate.

**Load Management Credits Issued** *(See Attachment Ld Mgmt)*

North Arkansas Electric Cooperative provides its members with the opportunity to receive load management credits on their bill for four months out of the year. By enrolling in the Load Management program, the member agrees to allow the cooperative to install load management switches on the member’s electric water heater and an electric air conditioner pulling specified minimum amperage. In 2012 we issued $343,918.91 in Load Management credits to members for allowing NAEC to decrease load during peak demand time. For more details on this rate, please see NAEC’s rate schedule No. 6 & 7, sheets 20-23.

*Labor and overhead put toward this program was not included in the figures listed above.*

**Blower Door** *(See Attachment Blower Door)*

In 2012 NAEC began offering blower door tests to members for a small fee. Three NAEC personnel are trained to conduct the tests. In total, the cooperative conducted 13 blower door tests in 2012. Of those, six followed through with the recommended energy efficiency measures and were issued rebates totaling $281.27.

**AECC Expenditures** *(See Attachment AECC Expenditures)*

These expenditures detailed in this attachment were made by AECC on behalf of the 17 distribution cooperatives in Arkansas and were for: (1) the electric cooperatives’ contribution for updating Frontier and Associates, Inc.’s Deemed Savings factors; (2) the electric cooperatives contribution to the Arkansas Energy Office for Energy Efficiency Arkansas information and education initiatives; and (3) the electric cooperatives contribution to the Arkansas Home Builders for conducting “Energy Code” classes to enhance the understanding of Arkansas home builders with regard to applicable energy efficiency codes. NAEC’s portion of this expenditure would equal $11,571.11.
Television Advertisement

North Arkansas Electric budgets each year an amount for TV ads to relay a variety of messages related to the co-op. In 2012 approximately 100% of those ads were directed toward energy efficiency education for a total of $1,500.00. These energy efficient ads ran throughout the year. Also during peak usage periods an “Energy Alert” ticker would scroll across KAIT TV 8 screens to inform members to curtail usage of non-essential appliances. This helped to reduce our summer peak demand.

Rural Arkansas Magazine

Each month we send out approximately 28,000 Rural Arkansas magazines to NAEC members. Likewise, approximately 20 percent of the available space for 2012 was dedicated to energy efficiency education. North Arkansas Electric’s 20 percent portion for energy efficiency equated to $18,198.40.

Fair & Expo Educational booths

Each year North Arkansas Electric Cooperative participates in one home show, two health fairs and three county fairs. We find that members ask employees several questions regarding the efficiency of their home and its appliances. The cooperative purchased brochures produced by NRECA highlighting ways to make your home efficient. When you combine the cost of these brochures and the amount spent on trade shows educating members, $1,193.50 was dedicated to energy efficiency during these events.

Summary

Approximate costs spent by North Arkansas Electric for energy efficiency and load shifting efforts as listed in this report total well over $400,000.
# ANNUAL OPERATING COST

Marathon™ vs. Conventional Water Heaters

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<th>Electric Rate =</th>
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<th>Natural Gas Rate =</th>
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## Comparison based on a Marathon™ water heater versus conventional steel water heaters

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<td>$44.54</td>
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Annual cost: **$433.44**

$240.22  $534.51  $279.03  $368.89

$5.38  Monthly Savings multiplied by remaining months in year equals the annual savings

Water Heater Innovations, Inc.
### Marathon Leases

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<th>Number of Leases</th>
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<th>Estimated Savings/Yr per Heater</th>
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**Demand Savings based on 4500 watt elements operating 20% of the time**

***For Estimated Savings/Mo per Heater, see Marathon Sheet***
## Energy Resource Conservation Loans

**Energy Efficiency Report**

Based on NAEC SEER Chart Savings

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<tr>
<th>Account Number</th>
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<th>New SEER/EER</th>
<th>Tonage</th>
<th>Estimated Annual Savings Per Ton</th>
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$2,272 28,770

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$468 5,920

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$1,691,21,413

$816  $10,333

$3,142  $39,781

$2,697  $34,152

$219  2,773

$19,817  $250,943
## Energy Resource Conservation Loans

**Energy Efficiency Report**

Based on Frontier Deemed Savings

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Year End Totals: 127,819 20.050
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* All figures are based on annual operating hours of 2750.

** Figures based on an average cost per kWh of 7.7, calculated by adding a 12 month average of the power cost and debt cost to our average residential rate of 6.8 cents.

*** Figures based on maintaining an indoor operating temperature of 75 degrees.
# Energy Audit Report

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* mileage calculated using .55 cent/mile
** overhead calculated based on $25/hour
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<td>Izard County Consolidated</td>
<td>10004160-005</td>
</tr>
<tr>
<td>Kaneb Pipeline</td>
<td>111838-001</td>
</tr>
<tr>
<td>Robert N Murphy</td>
<td>88127-001</td>
</tr>
<tr>
<td>St Mary of the Mount</td>
<td>108229-001</td>
</tr>
<tr>
<td>Dennis Taylor</td>
<td>10005631-002</td>
</tr>
<tr>
<td>Dan Garey</td>
<td>66591-003</td>
</tr>
<tr>
<td>Salem High School</td>
<td>10017938-002</td>
</tr>
<tr>
<td>Fulton County Water</td>
<td>76720-001</td>
</tr>
<tr>
<td><strong>Total KW Savings</strong></td>
<td><strong>2,154</strong></td>
</tr>
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*See Rate Schedule No. 17 on Sheet No. 35.1 & 35.2 for detailed rate information.*
<table>
<thead>
<tr>
<th></th>
<th># of Accounts</th>
<th>Amount Credited</th>
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<tbody>
<tr>
<td>Jun-10</td>
<td>KVAS</td>
<td>$ 85,148.34</td>
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<tr>
<td>Jul-10</td>
<td>KVAS</td>
<td>$ 89,619.41</td>
</tr>
<tr>
<td>Aug-10</td>
<td>KVAS</td>
<td>$ 87,669.73</td>
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<tr>
<td>Sep-10</td>
<td>KVAS</td>
<td>$ 81,481.43</td>
</tr>
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</table>

**Total Load Management Credits issued**: $ 343,918.91

* Refer to North Arkansas Electric Cooperative's Rate Schedule No. 6 & 7, sheets 20-23 for a complete description of rate including availability, application, credit, contract period and other provisions.
# Blower Door Testing

<table>
<thead>
<tr>
<th>Name</th>
<th>Account #</th>
<th>Charge</th>
<th>Rebate Issued</th>
<th>Date Rebate Issued</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson, Vincent</td>
<td>10577-001</td>
<td>$101.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anema, Ted</td>
<td>56579-001</td>
<td>$97.41</td>
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<tr>
<td>Appleton, Lyle</td>
<td>115146-001</td>
<td>$137.34</td>
<td>$40.34</td>
<td>3/15/2012</td>
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<tr>
<td>Barnett, Ed</td>
<td>63065-001</td>
<td>$112.50</td>
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<tr>
<td>Crawford, Carolyn</td>
<td>132760-002</td>
<td>$145.60</td>
<td>$29.88</td>
<td>6/18/2012</td>
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<td>Goodlett, Wallace</td>
<td>75457-001</td>
<td>$235.20</td>
<td>$75.00</td>
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<tr>
<td>Harrell, Samuel</td>
<td>72299-001</td>
<td>$104.65</td>
<td>$12.38</td>
<td>5/4/2012</td>
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<tr>
<td>Lee, Daniel</td>
<td>12246-001</td>
<td>$114.38</td>
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</tr>
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<td>Mathis, Bob</td>
<td>72563-001</td>
<td>$216.16</td>
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<tr>
<td>McManus, Bill</td>
<td>123843-001</td>
<td>$304.85</td>
<td></td>
<td></td>
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<td>Morgan, William</td>
<td>122538-001</td>
<td>$214.20</td>
<td></td>
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<tr>
<td>Smith, Scott</td>
<td>100911-001</td>
<td>$378.21</td>
<td>$75.00</td>
<td>4/19/2012</td>
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<td>Stanford, Dion</td>
<td>89886-001</td>
<td>$100.45</td>
<td>$40.67</td>
<td>5/21/2012</td>
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**Total Rebates Issued to Members for Energy Efficiency Improvements** $281.27
## Energy Efficiency

### 2012 Expenditures by the Rates and Forecasting Department

<table>
<thead>
<tr>
<th>Date</th>
<th>Frontier and Efficiency Associates</th>
<th>Energy Efficiency Home Arkansas</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>31 January 2012</td>
<td>$2,121.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23 April 2012</td>
<td></td>
<td>$139,215.20</td>
<td></td>
</tr>
<tr>
<td>2 May 2012</td>
<td></td>
<td>808.00</td>
<td></td>
</tr>
<tr>
<td>20 June 2012</td>
<td></td>
<td>689.78</td>
<td></td>
</tr>
<tr>
<td>3 October 2012</td>
<td></td>
<td></td>
<td>$30,000.00</td>
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<tr>
<td>10 October 2012</td>
<td></td>
<td>23,953.00</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$27,572.44</strong></td>
<td><strong>$139,215.20</strong></td>
<td><strong>$196,787.64</strong></td>
</tr>
<tr>
<td><strong>NAEC Portion</strong></td>
<td></td>
<td></td>
<td><strong>$11,571.11</strong></td>
</tr>
</tbody>
</table>

Expenditures are listed by invoice date
Carroll Electric Cooperative Corporation

Docket No. 08-045-RP
Carroll Electric Coop. Corp.

2012
Energy Efficiency
and
Conservation Report

Submitted to the
Arkansas Public Service Commission

Per Docket No. 06-004-R

(Developing and Implementing
Energy Efficiency Programs)

Box 4000 ◆ Berryville, AR 72616 ◆ 800-432-9720
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Mission Statement

We exist to serve our members
with safe, reliable, and convenient electricity
at the lowest possible cost.

Cooperative Energy Efficiency/Conservation Programs

As a cooperative, we exist to serve our members. Helping our members to conserve energy is consistent with our mission statement and continues to be a focal point of the services we provide. To accomplish energy efficiency and conservation, Carroll Electric Cooperative utilizes the following:


Carroll Electric Cooperative provides the above services free of charge for residential and small commercial accounts. These services are performed when a member would like advice about how to make his or her home or business more energy efficient. During 2012 Carroll Electric provided the following services:

<table>
<thead>
<tr>
<th>Number of contacts</th>
<th>Labor Expense</th>
<th>Transportation Expense</th>
<th>Combined Labor and Transportation Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>373 energy audits</td>
<td>$69,438</td>
<td>$11,832</td>
<td>$81,270</td>
</tr>
<tr>
<td>204 high bill complaints</td>
<td>37,977</td>
<td>6,471</td>
<td>44,448</td>
</tr>
<tr>
<td>15 miscellaneous field visits</td>
<td>2,094</td>
<td>476</td>
<td>2,570</td>
</tr>
<tr>
<td>64 building leakage tests</td>
<td>11,914</td>
<td>2,030</td>
<td>13,944</td>
</tr>
<tr>
<td>2 heating and cooling load calcs</td>
<td>372</td>
<td>63</td>
<td>435</td>
</tr>
<tr>
<td>Total</td>
<td>$121,795</td>
<td>$20,872</td>
<td>$142,667</td>
</tr>
</tbody>
</table>

After completing the field work for the above services, recommendations and notes are documented in our customer information system and scanned in the RV1 system.
Carroll Electric Cooperative Corporation

373 Energy Audits • 204 High Bills • 15 Misc. Field Visits were performed in 2012

A CECC representative has discussed the above information with me.

| Name: | | A/C#: | | Meter #: | | Seal #: | | Current Meter Reading: | | Date: | | Previous Meter Reading: | | Date: |
| KWH used | number of days | average daily usage |

1. **WINDOWS**
   - Type: ____________
   - RECOMMEND: Install weather-stripping
   - Use caulking

2. **INSULATION INSTALLED (TYPE AND APPROX. R-VALUE)**
   - Walls
     - Roof
     - Ceiling
     - Basement walls
     - Basement ceiling
   - RECOMMEND: Increase present amount of insulation to:
     - Walls 19
     - Roof 19
     - Ceiling 28
     - Basement walls 19
     - Basement ceiling 19
   - Vapor barrier should be turned toward heated area
   - Install 6-mil polyethylene ground cover

3. **DUCT SYSTEM**
   - Insulate supply ducts
   - Insulate air return
   - Check duct system for leaks and defects

4. **HEATING SYSTEM**
   - A. Heat pump
     - Age of heat pump ____________
     - Compressor amps ____________
     - Indoor/Outdoor fan amps ____________
     - Auxiliary kW heat strips ____________
   - B. Electric Furnace
     - kw heat strips ____________
     - Fan amps ____________
   - C. Other
   - **RECOMMEND:** Change or clean filters regularly, Service unit, Heat Pumps: Keep area clean around outdoor unit

5. **FIREPLACE**
   - How many ____________
   - Location ____________
   - Type ____________
   - **RECOMMEND:** Install glass doors, Install outside air supply, Keep damper closed when not in use

6. **PORTABLE HEATER/HEAT LAMP/HEAT TAPE**
   - How many ____________
   - Size ____________
   - Location ____________
   - **RECOMMEND:**

7. **AIR CONDITIONER**
   - Compressor amps ____________
   - Indoor/Outdoor fan amps ____________
   - Age of AC ____________
   - **RECOMMEND:** Change or clean filter regularly, Service unit, Keep area clean around outside unit

8. **TYPE OF ATTIC VENTILATION**
   - Intake ____________
   - Exhaust ____________

9. **WATER HEATER**
   - Type ____________
   - Location ____________
   - Size ____________
   - Top Element ____________
   - Setting ____________
   - Test ____________
   - Bottom element ____________
   - Setting ____________
   - Test ____________
   - No. in Family ____________
   - **RECOMMEND:** Insulate tank with inches insulation, Set thermostat at lowest satisfactory setting, approximately degrees. Replace

10. **WATER SYSTEM**
    - Type ____________
    - Size pump ____________
    - h.p. ____________
    - Amps ____________
    - Pressure tank ____________
    - Water leaks ____________
    - **RECOMMEND:** Correct defective pressure tank (waterlogged, leaks, etc.)
    - Correct leaks, faucets, lines, and etc.

11. **WIRING**
    - Inside/Outside ____________
    - **RECOMMEND:**

---

Comments and/or recommendations are made for the purpose of energy conservation only. CECC will not be held responsible for any charges incurred or related to these recommendations. See page 6 for example.
ENERGY AUDIT / HIGH BILL / FIELD VISIT - page 2

Name: ___________________________ Account Location #: ___________________________
Customer #: ___________________________

A. Major electricity users in your home:

<table>
<thead>
<tr>
<th>Heating:</th>
<th>kwh per hr of operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric furnace</td>
<td></td>
</tr>
<tr>
<td>Electric baseboard heat</td>
<td></td>
</tr>
<tr>
<td>Electric ceiling cable Heat</td>
<td></td>
</tr>
<tr>
<td>Electric heat pump</td>
<td></td>
</tr>
<tr>
<td>Heat pump</td>
<td></td>
</tr>
<tr>
<td>Heat strips</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Portable electric heater</td>
<td></td>
</tr>
<tr>
<td>Heat lamp or heat tape</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cooling:</th>
<th>kwh per hr of operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Conditioning</td>
<td></td>
</tr>
<tr>
<td>Fan</td>
<td></td>
</tr>
</tbody>
</table>

B. Other Electric Appliances:

<table>
<thead>
<tr>
<th>Electric water heater</th>
<th>approx. kwh per hour of operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerator</td>
<td>approx. kwh per month</td>
</tr>
<tr>
<td>Freezer</td>
<td>approx. kwh per month</td>
</tr>
<tr>
<td>Washer</td>
<td>approx. .33 kwh per load or 1 kwh / 3 loads</td>
</tr>
<tr>
<td>Dryer</td>
<td>approx. 5 kwh per load</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>approx. 1 kwh per load (with drying cycle and hot water 5 kwh)</td>
</tr>
</tbody>
</table>

Range:

<table>
<thead>
<tr>
<th>1275-watt Small surface element</th>
<th>kwh per hour of operation (when cycles 1/2 time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2200-watt Large surface element</td>
<td>1.1 kwh per hour of operation (when cycles 1/2 time)</td>
</tr>
<tr>
<td>2900-watt Oven - Bake cycle</td>
<td>1.7 kwh per hour of operation (when cycles 1/4 time)</td>
</tr>
<tr>
<td>Oven - Broil cycle</td>
<td>3.4 kwh per hour of operation (full time)</td>
</tr>
</tbody>
</table>

Appliance operating costs vary widely due to differing lifestyles of families and varying efficiencies of the appliances themselves. The appliance operating estimates contained here have been gathered from varying sources and give only average figures. They are not meant to be exact but will give you a general idea of costs of operation and possible places to conserve.
### Carroll Electric Cooperative Corporation

#### Energy Audit Recommendations

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>Account Number</th>
<th>Customer Number</th>
<th>Previous Reading</th>
<th>Current Reading</th>
</tr>
</thead>
</table>

**KWH used**  

<table>
<thead>
<tr>
<th>KWH used</th>
<th>Number of days</th>
<th>Average daily usage</th>
</tr>
</thead>
</table>

### Heating and Cooling System:

- **Set thermostat to 68°F in winter and 78°F in summer**

- Seal return and supply duct work using mastic, mastic tape, or silicone caulk.
- Clean the inside air conditioner coil with coil cleaner.
- Check the filter every 30 days and change or clean as needed.
- Wash outdoor unit (grass clippings and dirt), keep vegetation cut back.
- Add more return air. Two (2) sq. ft. /ton is necessary.
- Seal around edge of supply registers between the hole cut in the floor and the metal ducts.
- Never turn your heat pump thermostat to emergency heat unless your heat pump is malfunctioning.
- With a heat pump, leave the thermostat at one setting. Adjusting it more than 1 degree can cause the auxiliary heat to engage.

### Additional comments:

- **Attic:**
  - Use wind turbines, ridge vents, and/or soffit vents to improve attic ventilation.
  - Install a radiant barrier under the roof deck. Do NOT lay it on the attic floor.
  - Insulate and weather strip the attic access panel inside the house.
  - Add ____ inches of insulation to your attic to achieve an R Value of 38.

### Water Heater:

- **Set thermostat(s) to 120°F - 125°F for best efficiency**

  - Wrap your water heater with an insulating blanket. Place 2-inch foam insulation board under your water heater.
  - Insulate water lines above the water heater or install heat traps on the cold water inlet and hot water outlet.
  - Install a timer on the water heater circulating pump or discontinue use of pump.
  - Repair hot and/or cold water leaks.

### Additional comments:

### Building Leakage:

- **Keep infiltration to a minimum to reduce HVAC costs**

  - Caulk and seal recessed lighting.
  - Insulate and seal whole house attic fan. Ensure power to fan is disconnected before doing so.
  - Caulk and seal penetrations in the crawl space (plumbing, sewer, wiring, etc.).
  - Seal between the supply plenum and the ceiling.
  - Weather strip and air seal water heater/furnace closet.

### Additional comments:

### Miscellaneous:

- **Remember to turn off ceiling fans in unoccupied rooms**

  - Insulate the crawl space between the floor joists or insulate the inside perimeter of the crawl space.
  - Use window coverings. Insulated drapes are best. Use tinting where appropriate.
  - Install a timer on the pool pump.
  - Close the damper in the fireplace when not in use. Install glass doors and install outdoor combustion air supply.
  - Turn off computers when not in use for one (1) hour or more. Program the computer to enter sleep mode.

### Additional comments:

---

A CECC representative has discussed the above information with me.  
Visit carrollecc.com for more energy saving tips.

Member: ___________________________  
CECC Representative: _______________
Energy Audits

Carroll Electric Cooperative Corporation
**CARROLL ELECTRIC COOPERATIVE CORPORATION**

History of Contacts for Customer

<table>
<thead>
<tr>
<th>Name</th>
<th>Phone No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Opt** Date **CMP**

1. Opt Date
   - 1/23/2012
   - 7/13/2000

**Customer Contacts**

**Notes**

- **EA APPT** 01/24/12 FOR BA & JOEY @ 5:30
- **RECOMMENDATIONS** ARE TYPED OR SCANNED IN

+ F12=Cancel

**F2=Outs. Entries**  **F3=Exit**  **F6=New Entry**  **F11=Fold/Unfold**  **F12=Return**  **F17=Hist**

**F18=Disp by Prop**  **F20=Link**  **F21=Prt Hist**  **F22=Prt Credit**  **F23=Status**  **F24=Opt**
Energy Audit Recommendations

At Carroll Electric, our mission is to provide safe, reliable, and convenient electricity at the lowest possible cost. In an effort to fulfill our mission, Carroll Electric is pleased to provide this energy audit free of cost to you.

On January 24, 2012, Brian Ayers and Joey Magnini performed a commercial energy audit. Following are energy saving recommendations.

**Resource Management Office**

**Whole House Fan**

The whole house fan is located directly above the return air intake of your heating/cooling system. This is not an ideal location. When the heating/cooling system is operating, unconditioned attic air is being mixed with the conditioned air from inside the building. This causes the heating/cooling system to operate longer, and thus, increases electricity and propane usage.

If the fan is never used, consider having it removed and the hole in the ceiling patched with sheetrock. Then, add R-38 cellulose insulation above it.

If the fan is used throughout the year, consider constructing a wooden box with a hinged lid around the fan in the attic. Insulate the box with rigid foam board and weather strip the lid. Also, add a latch to the lid that will create a tight seal between the lid and the box.
Lighting

In the Resource Management Office, there are approximately 40 (40-watt) T12 fluorescent bulbs. The total wattage of these fixtures would be 40 x 40-watts equaling approximately 1,600 watts. These lights, not counting the energy consumed by the ballasts, would consume approximately 1.6 kilowatt hours (kwh) of electric energy per hour of operation. Following are two energy saving scenarios.

Scenario 1

Keeping the same lighting level and converting the T8 fluorescent bulbs:
Each 40 watt, T12 bulb emits an average of 2,610 lumens. The total average lumens in the office space would equal approximately 40 x 2,610 or 104,400 lumens. In comparison, a T8 fluorescent bulb is typically 32 watts and emits an average of 2,800 lumens. To achieve the same lighting level with the T8 bulbs, would require approximately 37, T8 bulbs. This change would reduce the total lighting load to 1,184 watts. The wattage reduction (1,600 minus 1,184) equals 416 watts.

\[
\text{(416 watts X 10 hours/day X 20 days/month)} / 1,000 \text{ watt hours} = 83.2 \text{ kwh saved/month}
\]

Scenario 2

Keeping the same number of fluorescent bulbs but switching from T12s to T8s:
A T12 bulb uses 40 watts, and a T8 bulb uses 32 watts for a savings of 8 watts per bulb.

Multiplying 40 bulbs X 8 watts = 320 watts saved in the office lighting.

\[
\text{(320 watts X 10 hours/day X 20 days/month)} / 1,000 \text{ watt hours} = 64 \text{ kwh saved/month}
\]

Summary:
Costs of the 32 fluorescent bulbs plus labor and any lighting fixture modifications should be considered during cost-justification calculations.
Air Sealing

Sealing the air barrier of a building is very important. All holes cut and drilled in the ceiling and framing of the building for electrical junction boxes, wiring, plumbing, ductwork, and ventilation allow unconditioned attic air into the conditioned space. Using caulk and/or expanding foam to seal these areas is recommended.

Bathroom Exhaust Fan

Bathroom exhaust fans should vent to the outside. If they are vented into attics and crawlspaces, the moisture in the exhaust air could condense and cause structural damage and possible mold formation. The bathroom exhaust fan vents directly into the attic. Ensure it is vented outside of the structure.

Ventilation

Attic ventilation is necessary to remove excess humidity and prevent condensation in the attic. Attic vents should be positioned both as high and low as possible. A continuous ridge vent and soffit vents are installed. However, the soffit vents are blocked by insulation and proper ventilation is not occurring. Ensure the soffit vents are clear of insulation or any other blockage. Also, install soffit to attic vents to help ensure proper ventilation.
Insulation

The Department of Energy recommends an attic insulation level of R-38 for this region. Currently the insulation level of this attic is approximately R-8 in most places, but it is completely missing in other places. Bring the insulation level up to R-38 by installing cellulose insulation according to the manufacturer's specifications. Before insulating, ensure all other work in the attic is completed (attic fan, sealing, exhaust fan, ventilation).
**Heating and Cooling System Recommendations**

**Return Intake**

Consider sealing around the return plenum with mastic sealant. Doing so will prevent unconditioned and unfiltered air from entering the duct system.

**Seal and Insulate Ductwork**

The ducts are generally wrapped with one-inch exterior insulation wrap. Consider removing all the exterior duct insulation to expose the duct joints. Then seal all joints in ductwork with mastic. Mastic is a long lasting duct sealant that should be applied to every duct connection. Once the ductwork is sealed, re-insulate all ductwork with two-inch duct wrap.

Use silicone caulk to seal around the edges of all supply registers. Doing so will prevent unconditioned crawlspace air from entering the conditioned space.
Filters

We recommend checking your filters every 30 days and cleaning them as needed. A dirty filter reduces airflow which reduces the efficiency of any heating/cooling system. Dirty filters lead to dirty coils, as seen below. Coils can be cleaned with aerosol coil cleaners.

Break Room

The return air pass through grill between the break room addition and the Resource Management offices needs to be sealed. It is allowing air to be pulled from outside the office's conditioned area. This causes a pressure imbalance in both buildings that encourages air infiltration. Consider placing a piece of rigid foam board in the grill to accomplish this. Seal around the edge of the board with silicone caulk.
Crawlspace Recommendations

Drainage and Moisture Issues

Evidence of standing water was found in the crawlspace of this building. Note the water line on the pier and the soil spread across the top of the moisture barrier. This issue should be addressed before proceeding with any other crawlspace recommendations. Remedies include installing French drains around the perimeter of the building, ensuring down spouts on gutters are directed away from the building’s foundation, and possibly installing a sump pump at the lowest point of the crawlspace.

Insulation

There are some options when insulating a crawlspace. Insulating the floor or the foundation wall. Installing batts of insulation between the floor joists is the most common option to insulate the floor. Another option is to install rigid foam board or spray foam on the foundation walls. Ideally, the crawlspace walls would be insulated, but this should only be done if the crawlspace is consistently dry. Also, the vapor barrier on the crawlspace floor need to extend at least one foot up the crawlspace walls.

Foundation Vents

It is recommended that foundation vents be opened during summer months and closed during winter months. However, if the moisture issue is resolved and the crawlspace is insulated; leaving the foundation vents closed year round is an accepted practice. If the vents are closed year round, consider covering them with rigid foam board. Doing so would keep the crawlspace cooler during summer months and warmer during winter months.
The construction of the Administrative Office mirrors are similar to that of the Resource Management Office. Similar issues were discovered in both offices. Please refer to the recommendations made for the Resource Management Office. Some specific issues in the Administrative office are noted below.

Missing Attic Insulation
Heating and Cooling System Recommendations

The filter for this unit is located inside the furnace. The current configuration is not filtering the air adequately. Consider discontinuing use of the filter inside the furnace and installing a return intake grill in which filters can be placed. Doing so will allow the filter to be changed more easily and regularly. Also, ensure furnaces are clear of anything that could inhibit proper operation.

Grounds and Maintenance

No significant energy improvement opportunities were discovered in the Grounds and Maintenance building.
Fire Cache

Heating/Cooling Unit

There were two sets of filters being used to filter air for the heating/cooling unit. There were multiple 14 X 14 return intake grills (some with filters, some without). Also, there was a washable filter in place inside the furnace. All filters were dirty. Only one set of filters should be used. However, filters must be installed and maintained at every location. For ease of inspection and replacement, consider using the 14 X 14 intakes as the filtering point. In the future, inspect the 14 X 14 filters on a monthly basis.

Ductwork

The method used to connect the ductwork is called the “finger joint.” This method tends to allow duct leakage. Seal all connections with a liberal application of mastic.

Outdoor A/C Unit

All outdoor units should be raised a minimum of six inches above ground level. Doing so prevents leaves, grass clippings, and dirt from restricting airflow across the outdoor coil. Outdoor coils should be cleaned periodically. This one is visibly dirty.
Garage Doors

Always ensure the garage doors are latched. Not latching them allows heat to escape during the winter months and infiltrate during the summer months.
Visitor’s Center

Insulation Recommendations

Consider installing an attic floor in areas that are not insulated. With the floor in place, the following recommendation can be implemented.

Over time, the existing insulation has collected dirt, been compressed, and repositioned. These issues have degraded its effectiveness. Considering the layout of the attic and the obstacles within it, it is recommended that the batt insulation be removed and cellulose insulation be installed in its place.
**Miscellaneous Recommendations**

**Radiant Barrier**

Consider installing a radiant barrier in the attic. Radiant barriers reflect the sun's radiant heat keeping your attic and everything in it cooler during the summer. During the winter, if installed properly, it could help retain the building's heat. This would be beneficial since your ductwork is in the attic.

**Front Door**

Consider installing a double entry vestibule at the front of the visitor's center. This will help reduce air infiltration and maintain the desired indoor temperature.

**Windows**

Consider installing window coverings for all windows. The window coverings could be drawn when the park is closed to help slow heat loss during the winter and heat gain during the summer.
**BUILDING LEAKAGE TEST**

64 Building Leakage Tests were conducted in 2012

<table>
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<th>Date of Test: 12/26/2012</th>
<th>Technician: Brian Wise</th>
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<tbody>
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<tr>
<td>Customer:</td>
<td>Building Address: 2676-1135-0</td>
</tr>
</tbody>
</table>

**Test Results**

1. **Airflow at 50 Pascals:**
   - 2486 CFM (+/- 0.3 %)
   - 10.57 ACH
   - 1.41 CFM per ft² floor area

2. **Leakage Areas:**
   - 256.5 in² (+/- 0.9 %) Canadian EqLA @ 10 Pa
   - 136.4 in² (+/- 1.6 %) LBL ELA @ 4 Pa

3. **Minneapolis Leakage Ratio:**
   - 0.00 CFM50 per ft² surface area

4. **Building Leakage Curve:**
   - Flow Coefficient (C) = 195.3 (+/- 2.6 %)
   - Exponent (n) = 0.650 (+/- 0.007)
   - Correlation Coefficient = 0.99963

5. **Test Settings:**
   - Test Standard: CGSB
   - Test Mode: Depressurization
   - Equipment: Model 3 Minneapolis Blower Door

**Infiltration Estimates**

1. **Estimated Average Annual Infiltration Rate:**
   - 118.1 CFM
   - 0.50 ACH
   - 19.7 CFM per person (using bedrooms + 1)

2. **Estimated Design Infiltration Rate:**
   - **Winter:**
     - 209.3 CFM
     - 0.89 ACH
   - **Summer:**
     - 145.7 CFM
     - 0.62 ACH

3. **Recommended Whole Building Mechanical Ventilation Rate:** (based on ASHRAE 62.2)
   - 21.2 CFM

**Cost Estimates**

1. **Estimated Cost of Air Leakage for Heating:**
   - $ 89 per year heating

2. **Estimated Cost of Air Leakage for Cooling:**
   - $ 43 per year cooling
BUILDING LEAKAGE TEST  Page 2

Date of Test: 12/26/2012  Test File

Building Conditions

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<tr>
<th>Inside Temperature</th>
<th>Outside Temperature</th>
<th>Heating Fuel</th>
<th>Heating Fuel Cost</th>
<th>Gas</th>
<th>Heating Efficiency</th>
<th>Heating Degree Days</th>
<th>Cooling Fuel Cost</th>
<th>Cooling SEER</th>
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# of Stories: 2.0

Heating Degree Days: 3478

Heating Fuel Cost: $0.88/1000 Btu

Heating Efficiency: 80.00

Cooling Degree Days: 1162

Cooling SEER: 10.0

Ventilation Weather Factor: 0.76

Energy Climate Factor: 21.0

# of Occupants: 1.0

Design Winter Wind Speed: 9.0 mph

Design Summer Wind Speed: 7.0 mph

Design Winter Temp Diff: 53.0 deg F

Design Summer Temp Diff: 23.0 deg F

Comments

Recommendations:
- Seal open return air chaseway from the attic side. This is allowing for temperature convection inside interior stud wall cavity and between the floors.
- Seal and insulated attic access by adding 1-2 inches of foam board and weather stripping.
- There is significant between the floor convection occurring due to open return air chaseway and open on joint area on front of bay window areas. See IR report for thermal imaging. This may or may not be a justified efficiency upgrade due to labor cost to correct, on the bay window issue.
- Seal the supply boots by caulking the metal to wood connection point with silicone caulk.
- Seal and insulate the opening for the gas water heater flue.
- Seal behind the panel box with spray foam and/or silicone caulk where the service wires enter the home. Caution: Power should be turned off at outside disconnect before completing work.
- Caulk the windows that show cracks with clear silicone caulk.
- Seal the ceiling fixtures and bathroom light fixture with silicone caulk.
- Seal around the rear door framing with either spray foam or caulk.
- There are a few insulation voids in the attic space. The majority of the attic is properly insulated.
- Seal the leakage on the air handler cabinet with silver aluminum tape.
- Seal electrical penetrations (if possible) through the top plate of wall studs or install outlet and switchplate gaskets to slow down infiltration.
- A large majority of infiltration in air handler closet can be attributed to the combustion and exhaust airflow of the gas furnace. In the future, consider an upgrade that will allow for this infiltration to be controlled.
Date of Test: 12/26/2012  Test File.

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<th>Nominal Flow</th>
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AIR LEAKAGE TEST RESULTS

Date of Test: 12/26/2012  Test File:

Test Performed For:

Test Results

1. Measured Leakage: 136 sq. in. (2486 CFM @ 50 Pa)
   This leakage area represents the cumulative size of all holes and cracks in the exterior of your house through which unconditioned outside air enters your home and conditioned air escapes.

2. Est. Annual Air Change Rate: 0.60 air changes/hour (19.7 CFM/person) *

3. Est. Cost of Air Leakage $131 per year (heating and cooling) *

Ventilation Guideline

ASHRAE Standard 62.2 recommends minimum ventilation requirements for residential buildings to maintain acceptable indoor air quality. Based on the results of this airtightness test, Standard 62.2 recommends that a whole building mechanical ventilation rate of 21 CFM be continuously provided in this building. **

Additional Information

If some of the house leakage is located in the forced air duct system, both the leakage rate and energy costs will tend to be higher than reported above. Duct leaks result in much greater air leakage because they are subjected to much higher pressures than typical house leaks. Duct leaks can also seriously degrade indoor air quality.

Many factors contribute to indoor air quality including ventilation rates, sources and locations of pollutants, proper operation of combustion appliances and occupant behavior. Additional testing is needed to fully evaluate the air quality in your house.

* The estimated annual air change rate is based on ASHRAE Standard 136-93 and assumes no mechanical ventilation. Actual air change rates and costs may differ from these estimates by a factor of 2 or more.

** ASHRAE Standard 62.2 also contains requirements for local kitchen and bathroom mechanical exhaust systems. These local exhaust systems may be incorporated into a whole building ventilation strategy. Consult Standard 62.2 for more information on ventilation strategies and specific requirements and exceptions contained in the Standard.
**Inspection Report**

<table>
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<tr>
<th>Report Date</th>
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<tr>
<td>Address</td>
<td>707 SE Walton Blvd</td>
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<tr>
<td>Thermographer</td>
<td>Brian Wise</td>
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**Image and Object Parameters**

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**Text Comments**

Air Infiltration

Convective air flow inbetween floors due to open rim joist and open return chaseway. Both will need to be sealed.
**Report Date** 12/26/2012

**Company** Carroll Electric Cooperative Corporation

**Address** 707 SE Walton Blvd

**Thermographer** Brian Wise

---

**Image and Object Parameters**

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**Text Comments**

**Air Infiltration**

Air infiltration around old water heater flue pipe. Remove pipe and seal.
# Inspection Report

**Report Date**  
12/26/2012

**Company**  
Carroll Electric Cooperative Corporation

**Address**  
707 SE Walton Blvd

**Thermographer**  
Brian Wise

---

**Image and Object Parameters**

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**Text Comments**

**Air Infiltration**

Air infiltration around the panel box. Seal the service wire entrance with spray foam to stop infiltration and caulk around the metal cabinet connection through the drywall.
**Report Date:** 12/26/2012

**Company:** Carroll Electric Cooperative Corporation

**Address:** 707 SE Walton Blvd

**Thermographer:** Brian Wise

**Image and Object Parameters**

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**Text Comments**

Air infiltration in return grill due to a duct disconnect. Part could be the connections on the supply plenum and part could be the result of return chaseway being open.
Air infiltration from attic access upstairs. Note the 32 degree temps. This will need to be sealed or weather stripped and insulated with 1-2 inches of foam board.
### Report Date
12/26/2012

### Company
Carroll Electric Cooperative Corporation

### Address
707 SE Walton Blvd

### Thermographer
Brian Wise

### Customer

### Site Address

### Contact Person

---

### Image and Object Parameters

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### Description
Air infiltration between floors due to (1) open return chaseway in center of home and (2) open rim joist area on south side of bay window bumpout. Both areas will need to be sealed to stop conductive and convective exchange.

### Text Comments
Air Infiltration
### Inspection Report

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<tr>
<td>Air infiltration from stud wall at fixture connection due to electrical penetration which needs to be foamed.</td>
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### Text Comments

Air Infiltration

---

32
Inspection Report

Report Date: 12/26/2012

Company: Carroll Electric Cooperative Corporation
Address: 707 SE Walton Blvd
 Thermographer: Brian Wise

Customer
Site Address
Contact Person

Image and Object Parameters

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Description
Conductive heat loss on slab connection of home. This is due to slab not being properly insulated.

Text Comments
Insulation Concern
**Image and Object Parameters**

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**Text Comments**

Air Infiltration

Heat loss due to open rim joist section. This is allowing convective heat exchange between the floors of the home.
Customer Contacts

Notes

Blower door test  .50 ACH
12/26/12—meter reading 20135 or 27 kwh daily usage
for last 12 days. Home has a 10 seer A/C and 80% gas
furnace. The water heater is 50-gallon electric. The home
has a high infiltration rate due to a couple of construction
features relating to the between the floor chaseways. The
air return is open from the attic, exposing interior stud
wall cavities and the between the floor joisted area. This
is also open on the south side of the front bay window
area, allowing high levels of conduction and convective
heat flow through the floors. The supply boots need
caulked. Attic has 13 inches of blown fiberglass insulation
or R33 with some void areas. The slab is not insulated
and is pulling heat from the home. There is an old water
heater flue that needs sealed, the panel box needs sealed
as well. The rear door has leakage around is as do some of
the windows with cracks. Advised to seal ceiling fixtures
with silicone caulk. Advised to seal and insulate the attic
access scuttle home upstairs. There is infiltration around
the outlets and switchplates which could be related to the
between the floor chase air flow issue. Gaskets could be
added. - BW
• **Heating and Cooling Load Calculations**

At the member’s request, heating and cooling load calculations are performed on new or existing homes. Load calculations allow us to advise the member of their structures’ wintertime heat loss and summertime heat gain in British Thermal Units per hour (Btuh). The necessary data to perform the calculation is often gathered on site but can be obtained from architectural drawings. The collected data is input into RHVAC Software. Presently, we use a program by Elite Software Development Inc.

The calculation process allows for various scenarios of thermal improvements and/or changes in efficiency of heating and cooling equipment. When these calculations have been prepared, we try to deliver the results in person and explain the economic paybacks of the various choices detailed in the calculation. (See pages 22-35)

• **Points of discussion**

♦ Thermal envelope of building
♦ Air infiltration rate of building
♦ Energy efficiency of HVAC equipment
♦ Proper duct design
  • Locations (pros and cons of the following): In attic, crawlspace, conditioned space
  • Insulation
  • Air tightness
  • Sized for correct air distribution/comfort
♦ Location of outdoor unit
  • For optimum heat transfer
  • For unrestricted air circulation
♦ Equipment dealer qualifications/considerations
  • Reputation and references
  • Written bid with model number of indoor and outdoor equipment to verify A.R.I. tested sets of equipment
  • Proposal to include all charges such as:
    ■ Taxes
    ■ Disposal fee
    ■ Refrigerant reclaim fee
    ■ Any miscellaneous fees
HVAC Load Calculations

for

Elite Software

RHVAC Residential HVAC Loads

Prepared By:

Brian Ayers
Carroll Electric Cooperative
P.O. Box 4000
Berryville, AR 72616
(870) 423-2161

Project Report

General Project Information
Project Title: Project Date: April 09, 2012
Client Name: Carroll Electric Cooperative
Client Address: P.O. Box 4000
Client City: Berryville, AR 72616
Client Phone: (870) 423-2161
Client Comment: Brian Ayers
Company Name: Carroll Electric Cooperative
Company Representative: Brian Ayers
Company Address: P.O. Box 4000
Company City: Berryville, AR 72616
Company Phone: (870) 423-2161
Company Fax: (870) 423-4815
Company E-Mail Address: bayers@carrollecc.com
Company Comment: It is recommended that the installing HVAC dealer provide a load calculation. The HVAC dealer is the one who is ultimately responsible for the unit's size, installation and operation.

Design Data
Reference City: Fayetteville, Arkansas
Building Orientation: Front door faces East
Daily Temperature Range: Medium
Latitude: 36 Degrees
Elevation: 1251 ft.
Altitude Factor: 0.956
Elevation Sensible Adj. Factor: 1.000
Elevation Total Adj. Factor: 1.000
Elevation Heating Adj. Factor: 1.000

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Check Figures
Total Building Supply CFM: 1,724 CFM Per Square ft.: 0.835
Square ft. of Room Area: 2,064 Square ft. Per Ton: 643
Volume (ft³) of Cond. Space: 18,574

Building Loads
Total Heating Required Including Ventilation Air: 40,660 Btuh 40,660 MBH
Total Sensible Gain: 36,243 Btuh 94 %
Total Latent Gain: 2,286 Btuh 6 %
Total Cooling Required Including Ventilation Air: 38,529 Btuh 3.21 Tons (Based On Sensible + Latent)

Notes
Rhvac is an ACCA approved Manual J and Manual D computer program.
All computed results are estimates as building use and weather may vary.
Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.

CFM Per Squareft.: 0.835
Squareft. Per Ton: 643
38
## Total Building Summary Loads

<table>
<thead>
<tr>
<th>Component Description</th>
<th>Area (sq ft)</th>
<th>Sensible Loss (Btu/hr)</th>
<th>Latent Gain (Btu/hr)</th>
<th>Total Gain (Btu/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1D-cf-o: Glazing-Double pane, operable window, clear, insulated fiberglass frame. u-value 0.49, SHGC 0.56</td>
<td>389.8</td>
<td>12,603</td>
<td>0</td>
<td>12,854</td>
</tr>
<tr>
<td>1N: Door-Metal - Polystyrene Core</td>
<td>88.9</td>
<td>2,054</td>
<td>0</td>
<td>904</td>
</tr>
<tr>
<td>12B-0sw: Wall-Frame. R-11 insulation in 2 x 4 stud cavity, no board insulation. siding finish, wood studs</td>
<td>1675.2</td>
<td>10,725</td>
<td>0</td>
<td>4,404</td>
</tr>
<tr>
<td>16C-38: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Vented Attic. No Radiant Barrier, White or Light Color Shingles, Any Wood Shake, Light Metal, Tar and Gravel or Membrane. R-38 insulation</td>
<td>2063.8</td>
<td>3,541</td>
<td>0</td>
<td>2,307</td>
</tr>
<tr>
<td>19C-6sp: Floor-Over enclosed unconditioned crawl space. R-11 insulation on exposed walls, sealed crawl space, passive, R-6 or R-6 board</td>
<td>2063.8</td>
<td>2,932</td>
<td>0</td>
<td>800</td>
</tr>
</tbody>
</table>

Subtotals for structure:

<table>
<thead>
<tr>
<th>Category</th>
<th>Area (sq ft)</th>
<th>Sensible Loss (Btu/hr)</th>
<th>Latent Gain (Btu/hr)</th>
<th>Total Gain (Btu/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>People:</td>
<td>4</td>
<td>920</td>
<td>1,200</td>
<td>2,120</td>
</tr>
<tr>
<td>Equipment:</td>
<td>300</td>
<td>1,200</td>
<td>1,500</td>
<td></td>
</tr>
<tr>
<td>Lighting:</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Ductwork:</td>
<td>4,080</td>
<td>714</td>
<td>1,407</td>
<td>2,122</td>
</tr>
<tr>
<td>Infiltration: Winter CFM: 68, Summer CFM: 34</td>
<td>4,725</td>
<td>352</td>
<td>644</td>
<td>996</td>
</tr>
<tr>
<td>Ventilation: Winter CFM: 0, Summer CFM: 0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>AED Excursion:</td>
<td>0</td>
<td>0</td>
<td>10.522</td>
<td>10.522</td>
</tr>
</tbody>
</table>

Total Building Load Totals: 40,660 Btu/hr, 36,243 Btu/hr, 2,286 Btu/hr, 38,529 Btu/hr

### Check Figures

- Total Building Supply CFM: 1,724 CFM Per Square ft: 0.835
- Square ft. of Room Area: 2,064 Square ft. Per Ton: 643
- Volume (ft³) of Cond. Space: 18,574

### Building Loads

- Total Heating Required Including Ventilation Air: 40,660 Btu/hr, 40,660 MBH
- Total Sensible Gain: 36,243 Btu/hr, 94%
- Total Latent Gain: 2,286 Btu/hr, 6%
- Total Cooling Required Including Ventilation Air: 38,529 Btu/hr, 3.21 Tons (Based On Sensible + Latent)

### Notes

Rhvac is an ACCA approved Manual J and Manual D computer program.


All computed results are estimates as building use and weather may vary.

Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.
### System 1 (Imported) Summary Loads

<table>
<thead>
<tr>
<th>Component Description</th>
<th>Area</th>
<th>Sens Loss</th>
<th>Lat Gain</th>
<th>Sens Gain</th>
<th>Total Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1D-cf-o: Glazing: Double pane, operable window, clear, insulated fiberglass frame, u-value 0.49, SHGC 0.56</td>
<td>389.8</td>
<td>12,603</td>
<td>0</td>
<td>12,854</td>
<td>12,854</td>
</tr>
<tr>
<td>11N: Door: Metal - Polystyrene Core</td>
<td>88.9</td>
<td>2,054</td>
<td>0</td>
<td>904</td>
<td>904</td>
</tr>
<tr>
<td>12B-0sw: Wall: Frame, R-11 insulation in 2 x 4 stud cavity, no board insulation, siding finish, wood studs</td>
<td>1675.2</td>
<td>10,725</td>
<td>0</td>
<td>4,404</td>
<td>4,404</td>
</tr>
<tr>
<td>16C-38: Roof/Ceiling: Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings). Vented Attic, No Radiant Barrier, White or Light Color Shingles, Any Wood Shake, Light Metal, Tar and Gravel or Membrane, R-38 insulation</td>
<td>2063.8</td>
<td>3,541</td>
<td>0</td>
<td>2,307</td>
<td>2,307</td>
</tr>
<tr>
<td>19C-6sp: Floor: Over enclosed unconditioned crawl space. R-11 insulation on exposed walls, sealed crawl space, passive, R-9 or R-6 board</td>
<td>2063.8</td>
<td>2,932</td>
<td>0</td>
<td>800</td>
<td>800</td>
</tr>
</tbody>
</table>

Subtotals for structure:

- Area: 31,855
- Sens Loss: 0
- Lat Gain: 0
- Sens Gain: 21,269
- Total Gain: 21,269

People:

- Quan: 4
- Sens Loss: 925
- Lat Gain: 1,200
- Sens Gain: 2,125
- Total Gain: 2,125

Equipment:

- Quan: 300
- Sens Loss: 1,200
- Lat Gain: 1,500
- Sens Gain: 2,700
- Total Gain: 2,700

Lighting:

- Quan: 0
- Sens Loss: 0
- Lat Gain: 0
- Sens Gain: 0
- Total Gain: 0

Ductwork:

- Quan: 4,080
- Sens Loss: 714
- Lat Gain: 1,107
- Sens Gain: 1,821
- Total Gain: 1,821

Infiltration: Winter CFM: 68, Summer CFM: 34

- Quan: 4,725
- Sens Loss: 352
- Lat Gain: 644
- Sens Gain: 1,000
- Total Gain: 1,000

Ventilation: Winter CFM: 0, Summer CFM: 0

- Quan: 0
- Sens Loss: 0
- Lat Gain: 0
- Sens Gain: 0
- Total Gain: 0

AED Excursion:

- Quan: 0
- Sens Loss: 0
- Lat Gain: 0
- Sens Gain: 0
- Total Gain: 0

System 1 (Imported) Load Totals:

- Total Heating Required Including Ventilation Air: 40,660 Btuh
- Total Sensible Gain: 36,243 Btuh
- Total Latent Gain: 2,286 Btuh
- Total Cooling Required Including Ventilation Air: 38,529 Btuh

**Notes:**

Rhvac is an ACCA approved Manual J and Manual D computer program. Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D. All computed results are estimates as building use and weather may vary. Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.
### Detailed Room Loads - Room 1 - Main Floor (Average Load Procedure)

#### General

<table>
<thead>
<tr>
<th>Calculation Mode:</th>
<th>Htg. &amp; clg.</th>
<th>Occurrences:</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room Length:</td>
<td>68.0 ft.</td>
<td>System Number:</td>
<td>1</td>
</tr>
<tr>
<td>Room Width:</td>
<td>30.4 ft.</td>
<td>Zone Number:</td>
<td>1</td>
</tr>
<tr>
<td>Area:</td>
<td>2,064.0 sq. ft.</td>
<td>Supply Air:</td>
<td>1,724 CFM</td>
</tr>
<tr>
<td>Ceiling Height:</td>
<td>9.0 ft.</td>
<td>Supply Air Changes:</td>
<td>5.6 AC/hr</td>
</tr>
<tr>
<td>Volume:</td>
<td>18,574.0 cu. ft.</td>
<td>Req. Vent. Clg:</td>
<td>0 CFM</td>
</tr>
<tr>
<td>Number of Registers:</td>
<td>14</td>
<td>Actual Winter Vent.:</td>
<td>0 CFM</td>
</tr>
<tr>
<td>Runout Air:</td>
<td>123 CFM</td>
<td>Percent of Supply:</td>
<td>0%</td>
</tr>
<tr>
<td>Runout Duct Size:</td>
<td>6 in.</td>
<td>Actual Summer Vent:</td>
<td>0 CFM</td>
</tr>
<tr>
<td>Runout Air Velocity:</td>
<td>627 ft./min.</td>
<td>Percent of Supply:</td>
<td>0%</td>
</tr>
<tr>
<td>Runout Air Velocity:</td>
<td>627 ft./min.</td>
<td>Actual Winter Infil.:</td>
<td>68 CFM</td>
</tr>
<tr>
<td>Actual Loss:</td>
<td>0.119 in. wg./100 ft.</td>
<td>Actual Summer Infil.:</td>
<td>34 CFM</td>
</tr>
</tbody>
</table>

### Item Description

<table>
<thead>
<tr>
<th>Description</th>
<th>Area Quantity</th>
<th>U-Value</th>
<th>Htg HTM</th>
<th>Sen Loss</th>
<th>Clg HTM</th>
<th>Lal Gain</th>
<th>Sen Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Wall-12B-0sw 51.5 X 9</td>
<td>447.5</td>
<td>0.097</td>
<td>6.4</td>
<td>2,865</td>
<td>2.6</td>
<td>0</td>
<td>1,756</td>
</tr>
<tr>
<td>E-Wall-12B-0sw 68.2 X 9</td>
<td>495.1</td>
<td>0.097</td>
<td>6.4</td>
<td>3,170</td>
<td>2.6</td>
<td>0</td>
<td>1,302</td>
</tr>
<tr>
<td>S-Wall-12B-0sw 51.5 X 9</td>
<td>40.1</td>
<td>0.097</td>
<td>6.4</td>
<td>2,567</td>
<td>2.6</td>
<td>0</td>
<td>1,054</td>
</tr>
<tr>
<td>W-Wall-12B-0sw 68.2 X 9</td>
<td>331.6</td>
<td>0.097</td>
<td>6.4</td>
<td>2,123</td>
<td>2.6</td>
<td>0</td>
<td>872</td>
</tr>
<tr>
<td>E-Door-11N 37.8 X 1</td>
<td>37.8</td>
<td>0.350</td>
<td>23.1</td>
<td>873</td>
<td>10.2</td>
<td>0</td>
<td>384</td>
</tr>
<tr>
<td>S-Door-11N 17.8 X 1</td>
<td>17.8</td>
<td>0.350</td>
<td>23.1</td>
<td>411</td>
<td>10.2</td>
<td>0</td>
<td>384</td>
</tr>
<tr>
<td>W-Door-11N 33.3 X 1</td>
<td>33.3</td>
<td>0.350</td>
<td>23.1</td>
<td>773</td>
<td>10.2</td>
<td>0</td>
<td>339</td>
</tr>
<tr>
<td>N-Gls-1D-cf-o shgc-0.56 100%S</td>
<td>16.0</td>
<td>0.490</td>
<td>32.3</td>
<td>517</td>
<td>20.1</td>
<td>0</td>
<td>321</td>
</tr>
<tr>
<td>E-Gls-1D-cf-o shgc-0.56 63%S</td>
<td>80.5</td>
<td>0.490</td>
<td>32.3</td>
<td>2,603</td>
<td>35.4</td>
<td>0</td>
<td>2,847</td>
</tr>
<tr>
<td>S-Gls-1D-cf-o shgc-0.56 100%S</td>
<td>44.8</td>
<td>0.490</td>
<td>32.3</td>
<td>1,447</td>
<td>20.0</td>
<td>0</td>
<td>897</td>
</tr>
<tr>
<td>W-Gls-1D-cf-o shgc-0.56 63%S</td>
<td>248.5</td>
<td>0.490</td>
<td>32.3</td>
<td>8,035</td>
<td>35.4</td>
<td>0</td>
<td>8,789</td>
</tr>
<tr>
<td>UF-Ceil-16C-38 68 X 30.4</td>
<td>2063.8</td>
<td>0.026</td>
<td>1.7</td>
<td>3,541</td>
<td>1.1</td>
<td>0</td>
<td>2,307</td>
</tr>
<tr>
<td>Floor-19C-Sep 30.4 X 68</td>
<td>2063.8</td>
<td>0.125</td>
<td>1.4</td>
<td>2,932</td>
<td>0.4</td>
<td>0</td>
<td>600</td>
</tr>
</tbody>
</table>

Subtotals for Structure: 31,855
Infil. Win.: 68.1, Sum.: 34.1 2,154 2.194 4.725 0.299 352 644
Ductwork: 4,080 1,407
AED Excursion: 30 10,522
People: 230 la/per, 300 sen/per: 4 920 1,200
Equipment: 300 1,200
Room Totals: 40,660 1,572 36,243
## System 1 Room Load Summary

<table>
<thead>
<tr>
<th>Room No.</th>
<th>Name</th>
<th>Area SF</th>
<th>Htg Sens Btu/h</th>
<th>Min Htg CFM</th>
<th>Run Duct Size</th>
<th>Clg Sens Btu/h</th>
<th>Clg Lat CFM</th>
<th>Min Clg CFM</th>
<th>Act Sys CFM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Main Floor</td>
<td>2,064</td>
<td>40,660</td>
<td>1,547</td>
<td>14-5</td>
<td>627</td>
<td>36,243</td>
<td>1,572</td>
<td>1,724</td>
</tr>
<tr>
<td></td>
<td>Duct Latent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>System 1 total</td>
<td>2,064</td>
<td>40,660</td>
<td>1,547</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

System 1 Main Trunk Size: 14x20 in.
Velocity: 887 ft./min
Loss per 100 ft.: 0.064 in.wg

## Cooling System Summary

<table>
<thead>
<tr>
<th>Cooling Tons</th>
<th>Sensible/Latent Split</th>
<th>Sensible Btu/h</th>
<th>Latent Btu/h</th>
<th>Total Btu/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.21</td>
<td>94% / 6%</td>
<td>36,243</td>
<td>2,286</td>
<td>38,529</td>
</tr>
</tbody>
</table>

Net Required:
- **Water Heater Evaluations**

We routinely entertain many questions regarding water heaters. This provides us with the opportunity to advise our members regarding ways to reduce energy consumption used in heating water...such as reducing tank temperature, ways to reduce the volume of hot water consumed, insulation of hot water lines, possible addition of more insulation to the water heater, preferred water heater locations, and the potential high energy consumption caused by hot water circulation systems.

Carroll Electric Cooperative sold 92 Marathon Water Heaters in 2012—resulting in total energy savings of approximately $920 annually for our members.

Though we sell these as a retail item, we price them at our cost to increase the affordability to our member.

Shown is a Marathon Water Heater price list and brochure.
• **Member Education**

Carroll Electric Cooperative embraces every opportunity to educate its members about energy efficiency and conservation. Aside from the before-mentioned informal education provided by Carroll Electric Cooperative employees, we provide a number of formal educational opportunities to our members.

- **School, Community, and Civic Club Events/Presentations**

  - In 2012, Carroll Electric’s member services representatives participated in 26 events/presentations pertaining to energy conservation. Labor cost was approximately $2,304.00 and transportation cost was $552.00, for a total cost of $2,856.

  - Magician, Scott Davis, performed 26 presentations to approximately 4,674 students promoting energy efficiency/safety in local elementary schools in Carroll Electric service areas. Labor cost was approximately $3,734 and transportation cost was $832.00 for a total cost of $4,566.

![Scott Davis, Magician, promoting Energy Efficiency](image.png)
Media Communications

- Beyond the Lines—Carroll Electric’s Newsletter—Each newsletter was filled with pertinent information about energy tips and services and inserted with the member’s monthly bill. Energy Efficiency articles follow. Of the total production and labor cost, $10,144 was attributed to energy efficiency.

---

2012 Member Survey Results

<table>
<thead>
<tr>
<th>Member Priorities</th>
<th>Satisfaction Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on the 2012 Member Survey</td>
<td>Based on 9,874 Surveys Returned</td>
</tr>
<tr>
<td>1. Affordability</td>
<td>Excellent - 7.6 out of 9</td>
</tr>
<tr>
<td>2. Reliability</td>
<td>Excellent - 8.0 out of 9</td>
</tr>
<tr>
<td>3. Disaster Response</td>
<td>Excellent - 7.9 out of 9</td>
</tr>
<tr>
<td>4. Energy Efficiency</td>
<td>Excellent - 7.8 out of 9</td>
</tr>
<tr>
<td>5. Public Safety</td>
<td>Excellent - 8.0 out of 9</td>
</tr>
<tr>
<td>6. Environmental</td>
<td>Excellent - 7.9 out of 9</td>
</tr>
</tbody>
</table>

Carroll Electric Cooperative is celebrating its 75th anniversary this year. The 150 founding members wanted the power and convenience electricity offered them. Seventy-five years later, over 70,000 members want the very same thing. In May, you were mailed a survey and asked to rate the Cooperative’s performance. Over 9,800 respondents gave Carroll Electric an "EXCELLENT" rating in all categories. (See individual scores at left.) In the survey two years ago, you ranked affordable electricity and reliable electricity as the most important things for Carroll Electric to provide.

Call to action. *It is important to be conscious of your energy use in the mid to late afternoon on extremely hot days.* If the collective Cooperative membership conserves and reduces the use of electricity during these peak demand times, the cost of wholesale power will be less likely to increase. This equates to keeping your bill (and rates) as low as possible. What can you do?

- Postpone the use of large appliances such as the water heater, washing machines, dryers, dishwashers, and ovens until after 7:00 p.m.
- Use window coverings such as blinds and drapes to keep sunlight out of west-facing rooms.
- Use a programmable thermostat which can be set to adjust the air conditioner a few degrees higher during peak demand times.
- Landscape your home to achieve as much shade as possible on its west side.
- Cook using a microwave oven or outdoor grill (on a covered patio!)
- Turn off all unnecessary lights and enjoy the use of natural lighting.

Do your part...using less, means more than you realize. The more you know about your cooperative, the better we all become!
How Do Air-Source Heat Pumps Work?

By transferring heat between a house and outside air, these devices trim electricity use by as much as 30 to 40 percent in moderate climates.

SUMMER

Compressor
Increases refrigerant pressure to accept the maximum heat from the air.

Condenser*
Cools move refrigerant (and with it, hot or cold air) to or from outside air.

Evaporator*
Cools move refrigerant (and with it, hot or cold air) to or from outside air.

Air Handler
Fan blows air into a home's ducts.

Reversing Valve
Switches the direction of the refrigerant flow, changing the heat pump's output to hot or cold air (controlled by thermostat).

* Condenser and Evaporator swap roles during summer and winter.

WIN an all-expense-paid trip to Washington, D.C.

Who? Any high school junior may apply.
When? June 16-21, 2012
What? Fly to D.C., visit the Capitol, historical monuments, Mount Vernon, and more!
Cost? FREE!
Go to www.carrolleelectric.com or call 800-432-9720.
Deadline: MARCH 31

Energy Tip

More lighting tips.

To get the most “light” from all types of bulbs, clean bulbs and fixtures regularly. Dust and other grime reduce the lumens (a measurement of brightness).

Use timers and motion detectors for porch or outdoor lighting. The lights will be on when you need them, and off when you don’t.

Swimming Pool tips:

A clean pool for your family doesn’t have to break the bank.

• Run your pool’s pump for six hours or less per day.
• Use a timer to run your filter for several short periods rather than allowing debris to pile up after one long continuous filtration.

For your safety:

• Always use sunblock.
• Never leave children unattended.

For an energy-smart deal on your next appliance...

• read the EnergyGuide label.
• compare the energy use of competing models.
• estimate their differences in energy costs. Carroll Electric charges 7.225¢ per kWh.
• consider purchase price and estimated energy use when deciding which brand or model to buy.

Be Safe and Save Energy this Holiday Season

While you’re busy in the kitchen preparing your family’s holiday feast, Carroll Electric wants to help keep your family safe and your energy bills low.

According to the National Fire Protection Agency, cooking equipment is the cause of approximately 40 percent of home structure fires. As you prepare to show off your cooking and baking skills this holiday season, remember the following tips to avoid shocks or fires:

- Inspect all small appliances and electric cords to make sure they are in good condition before using. Don’t use appliances if cords are cracked or frayed.
- Never plug more than one high-wattage appliance, such as a blow dryer, microwave, or toaster oven, into a single outlet.
- Stay focused and attentive to baking, brewing, and simmering foods.
- Always know the location of a working fire extinguisher, and know how to operate it.

Cooking is also a great area to save energy. Keep these energy efficient tips in mind while preparing your holiday meals this year:

- Think small - opt for a smaller appliance, such as a toaster oven or microwave, whenever possible. Efficient microwave ovens use around 50% less energy than conventional ovens.
- Turn the oven or stove burners off a few minutes before your food is ready - they will remain hot enough to finish cooking the food.
- If you have a choice, bake with ceramic or glass dishes - this will allow you to lower the oven temperature by about 25 degrees Fahrenheit.
- Don’t peek - opening the oven door can lower the internal temperature as much as 25%.
- Make sure your pan covers the coil of your range - if you can see coil peeping out from the sides of your pan, you need a bigger pan (or a smaller burner).
- Put a lid on it - cover pans while cooking to prevent heat loss.

These steps are easy to follow and come at no extra cost. Making a habit out of them will save you both energy in the kitchen and money on your electric bill.
Arkansas Living Magazine—Arkansas Living magazine is provided to every member of Carroll Electric Cooperative. It is an excellent media to educate our members. CECC paid $307,119 for the publishing and delivery plus an additional $14,937 for in-office pre-production cost. Thirty-five percent ($112,720) of the combined costs listed above was dedicated to energy efficiency communication.

Let a Building Analyst offer free, customized home energy advice this winter

Electric bills vary with the seasons, driven by weather and personal energy use patterns. Weather matters. When it's cool outdoors, families want the house warm. And when it's hot outside, air conditioners make living areas a lot more pleasant.

To minimize how weather affects your electric bills, begin by getting a complete energy assessment of your home. A free service offered by Carroll Electric. Your Cooperative has four Building Analysts recently certified by the Building Performance Institute, a nationally recognized credentialing organization for residential energy efficiency retrofit, weatherization, and energy auditor professionals. These energy specialists will make recommendations that could save hundreds of dollars by uncovering energy waste and identifying areas where energy efficiency improvements can be made.

How much weather affects your electric bills depends on many factors, including your home’s original construction materials, insulation, and air leaks. During the current winter season, heated air leaving a home through those essentially invisible cracks and crevices wastes the money spent to warm it. A free building leakage test performed by a team of Carroll Electric Building Analysts will identify the locations where air infiltration is causing higher energy use. When you know where these mysterious "hot" and "cold" spots exist, you can solve the leaks by installing gasket seals around outlets and weather stripping along doors and windows, replacing old windows, or upgrading insulation. The Building Analyst can even recommend how to adjust landscaping to provide sunlight for your property in winter and shade in the summer.

For those who rent and pay your own utility bills, weather can be a budget-breaker. You may want to educate your landlord about the benefits of performing a building leakage test. Winter (or summer) weather doesn’t have to play havoc with electricity bills.

There are a variety of resources available to solve all sorts of energy challenges. Let the expertise of a Carroll Electric Building Analyst be of service to you. Call 800-432-9720 to schedule your free building leakage test and learn how to keep your energy bills as low as possible.

Happy New Year

Start the new year out right with a "smart" power strip

Electronics account for 8.1 percent of your home’s energy use. Cut costs by plugging items into a power strip and turning the strip off when not in use. "Smart" power strips are another good option—when one master device like a TV is turned off, it cuts power to other selected items (DVD players, gaming consoles, stereos, etc.).

Source: U.S. Department of Energy
Energy efficiency tip of the month... Air is drawn into your home from low areas, so inspect your foundation for potential air infiltration points. Fixing these leaks makes a bigger impact on your electric bill than sealing doors and windows. Caulk all cracks and gaps around your home including spaces around wires for telephone, electrical and cable, and around gas lines, water spigots and dryer vents. Find more ways to save at TogetherWeSave.com. 

Source: Touchstone Energy® Cooperatives

CARROLL ELECTRIC
Edition

Spring is the perfect time to do a lot of things! Your cooperative recommends doing an inspection of your home for the purpose of staying cool during the upcoming summer months. Now is the perfect time to check your home’s insulation. Or, better yet, have Carroll Electric do it for you at no charge! Your cooperative can do the inspections and offer recommendations for improving R-value and other insulation benefits. Simply call 800-432-9720 to discuss the energy audit process.

If you are a do-it-yourselfer, this visual might be beneficial for areas to check and subsequently add insulation if you discover the absence of insulation, not enough insulation, or air infiltration in any of these areas.

Examples of where to insulate:

1. In unfinished attic spaces, insulate between and over the floor joists to seal off living spaces below.
2A. attic door access
2. In finished attic rooms with or without dormers, insulate... 2A. between the studs of "free" walls;
2B. between the studs and rafters of exterior walls and roof;
2C. ceilings with cold spaces above;
2D. extend insulation into joist spaces to reduce air flow.
3. All exterior walls, including:
3A. walls between living spaces and unheated garages, shed roofs, or storage areas;
3B. foundation walls above ground level;
3C. foundation walls in heated basements, full wall either interior or exterior.
4. Floors above cold spaces, such as vented crawl spaces and unheated garages. Also insulate...
4A. any portion of the floor in a room that is extended beyond the exterior wall below;
4B. slab floors built directly on the ground (applicable for new construction);
4C. as an alternative to floor insulators, foundation walls or unvented crawl spaces;
4D. extend insulation into joist space to reduce air flow.
5. Band joints.
6. Replacement or storm windows and caulking and seal around all windows and doors.
With the heating season now behind us, it's time to check the filter on your heating/cooling system. If it is even a little dirty, replace it. Your system will run more efficiently, saving you money on your energy bills. It's an easy thing to put off or simply forget to do. However, the cooling season will be upon us in no time! By spending just a couple minutes to change the filter, you could save as much as $82 a year.

When to Turn Off Personal Computers

If you're wondering when you should turn off your personal computer for energy savings, here are some general guidelines to help you make that decision.

Though there is a small surge in energy when a computer starts up, this small amount of energy is still less than the energy used when a computer is running for long periods of time. For energy savings and convenience, consider turning off:

- the monitor if you aren't going to use your PC for more than 20 minutes.
- both the CPU and monitor if you're not going to use your PC for more than 2 hours.

Make sure the monitors, printers, and other accessories are on a power strip/surge protector. When this equipment is not in use for extended periods, turn off the switch on the power strip to prevent them from drawing power even when shut off. If you don't use a power strip, unplug extra equipment when not in use.

Most PCs reach the end of their "useful" life due to advances in technology long before the effects of being switched on and off multiple times have a negative impact. The bottom line... the less time a PC is on, the longer it will "last."
You've heard him on the radio—now see him LIVE!

TWO LOCATIONS

Thursday, Sept. 13 -
Community Building
6:30 p.m.
110 N. Mt. Olive
Siloam Springs, Ark.

NEW LOCATION!

Friday, Sept. 14 -
Riordan Hall
9:00 a.m.
98 Clubhouse Dr.
Bella Vista, Ark.

Doug Rye

UNPLUGGED

A widely-recognized home energy-efficiency expert Doug Rye, better known as the "King of Caulk and Talk," is touring live in Siloam Springs and Bella Vista! If you have never attended one of Doug Rye’s energy efficiency seminars, you are in for a pleasant surprise. He’s funny, witty, and he knows what he is talking about. All plugs are out as he gets candid about how to save on your home utility bills. Call 800-432-9720, ext. 1304 to reserve your seat. Leave your name, telephone number, how many will be attending, and the location where you will be attending.

Free energy-efficiency seminars... open to the PUBLIC!

Energy-efficiency expert Doug Rye will be in Siloam Springs and Bella Vista! If you have never attended one of Doug’s energy-efficiency seminars, you are in for a pleasant surprise. He’s funny, witty, and he knows what he is talking about. Learn how to save on your home utility bills. Call 800-432-9720, ext. 1304 to reserve your seat. Leave your name, telephone number, how many will be attending, and the location where you will be attending.

Refreshments will be served! 
- **Radio and newspaper**—Carroll Electric promoted energy efficiency ads on various radio stations and newspapers. In 2012, approximately 25% ($19,328) of radio and newspaper ads were promoting energy efficiency.

- **Carroll Electric Cooperative Website**—Our website (www.carrollecc.com) provides information about energy saving tips and products. In 2012, approximately 25% of Carroll Electric’s website was directed toward energy efficiency. This amounts to $3,902 for website maintenance for both in-office labor ($1,314) and outside contracts ($2,588).

- **Energy Efficiency Brochures**—Carroll Electric distributes energy efficiency brochures to our members.
*Doug Rye Seminars in 2012*

Last September, Carroll Electric sponsored two Doug Rye energy-efficiency seminars for our members, one in Siloam Springs and one in Bella Vista. Doug presented approximately three-hour seminars using props, humor, extensive knowledge in energy efficiency, question and answer sessions. Carroll Electric advertised these seminars in the *Arkansas Living* magazine, radio stations, and newspapers. Advertising, room rental, labor costs, and transportation total $3,068.00. We also promote Doug Rye and his message through the below brochures, *“Home Remedies”* and *“Energy Efficient Home.”*

Carroll Electric helps sponsor Doug Rye’s nationally-broadcasted weekly radio program *“Home Remedies”* on various radio stations.
• **2012 Extreme Home Makeover**

In 2012, Carroll Electric participated in the statewide “Energy Efficiency Home Makeover” worth $50,000. As a semi-finalist, a member of Carroll Electric received a free energy-efficient, 40-gallon Marathon water heater.

• **Employee Training**

- Employees attended the spring AMSA conference at Mt. Magazine and the Tri-State Conference in Hot Springs. Topics included commercial energy audits, 2012 Home Makeover update, Arkansas Electric Vehicle Rally, water heaters technology updates, and various other ways to promote energy efficiency and conservation.
- Four Carroll Electric employees completed Building Performance Institute (BPI) Analyst Training and passed the BPI Analyst Exam to complete their certification.
- Employee was secretary of the North Central HVAC Association and attended one meeting each month for nine months.
- Labor, transportation, conference registration, and lodging, totaled approximately $21,822.

• **Energy Efficiency Equipment**

Carroll Electric utilizes four infrared thermal imaging cameras and two building leakage/blower door testing units. This equipment enables our personnel to provide much more accurate energy conservation advice to our members.
• **Demand Reduction**

  ♦ **Load Control Switches**

  Carroll Electric's voluntarily load control program for air conditioners and water heaters was implemented in 1983. The interruption of the appliance is accomplished by the transmission of FM radio signals received by a load shedding switch on the appliance. The program is designed to lower the peak demand of electricity during the summer months of June, July, August, and September. Participating members' air conditioners and/or water heaters are cycled off and on during the peak load hours which are typically from 4 to 8 o'clock in the evening. We currently have 1,076 air conditioner switches and 2,367 water heater switches.

  Carroll Electric members are given a monthly credit on their summer bills for participating in the load control switch program. Members are advised to use as little electricity as possible during the peak load time frame. Due to the age of our system and technology, we are exploring more effective ways to control air conditioning and/or water heating loads.

  ♦ **Peak Alert Communications**

  Contacted all our customers with valid email addresses and asked them to conserve energy and shift their load.

  *Whew, it is really hot!* As a member of Carroll Electric, you've told us keeping electric rates as low as possible is important to you. Well, producing electricity can cost more on very hot days. We can meet the high demand for electricity this summer but the more we conserve, the more we save. Let's work together on this!

  Here are a few energy conservation suggestions to help keep costs down and your bills lower:
  - Set your cooling system thermostat at the highest level you can comfortably stand.
  - Use ceiling or free-standing fans to circulate air but remember, fans cool people, not rooms, so turn them off when not needed.
  - Please use major appliances like ovens, dishwashers, washing machines, and dryers early in the day or after 7:00 p.m.
  - Take hot showers in the morning or late in the evening and launder your clothes using cold water to minimize the use of your electric hot water heater.
  - Keep shades and curtains drawn over windows to help block sunlight.
  - Turn off lights when not in use.
  - And, now is a great time to check your air filter...dirty filters cause your air conditioner to work harder.

  Rising temperatures will mean higher electric bills. There is simply no avoiding it. However, reducing consumption on the hotter days, especially between 2:00 p.m. and 7:00 p.m., will ultimately reduce your cost below what it would have otherwise been.

  Feel free to contact one of our energy experts at 1.800.432.9720 to learn more about how to manage the heat. The beauty of being a cooperative is that we can all work together to lower the demand and cost for electricity. Be safe out there!

  Nancy Plagge  
  Director of Corp. Communications  
  Carroll Electric Cooperative Corp.
• **Optional Commercial (Over 50 kW)**

Customers that are able to substantially control their load during peak demand hours are rewarded with a significant reduction in demand cost. Conversely, the penalty for electrical load during the coincident peak demand hours is a significant increase in the cost per kW.

Available to both single and three-phase services requiring more than 50 kW of measured demand:

- Coincident Demand @ $8.58 kW
- All kW Billing Demand @ $1.80 kW
- All kWh @ 3.369¢ / kWh

During 2012, the cooperative had 12 qualifying customers that chose to participate in this voluntary demand reduction rate. By closely monitoring their hourly usage, they voluntarily shifted their usage away from our peak demand, and shifted an estimated 18,576 kW off the peak.

• **Voluntary Contribution from the Electric Cooperatives of Arkansas**

The Electric Cooperatives of Arkansas (ECA) voluntarily contributed $139,215.20 to the Energy Efficiency Arkansas Program expenses on behalf of Carroll Electric and 16 other cooperatives. Carroll Electric’s portion was $21,817.20. This contribution represents the Electric Cooperatives' pro-rata share of program costs for the period January 1 - December 31, 2012.
Summary:

Identifiable costs associated with promoting energy efficiency:

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<tr>
<th>Category</th>
<th>Labor</th>
<th>Transportation/Equipment/ Lodging/ Registration Fee</th>
<th>Purchased Advertising</th>
<th>Production Cost (Materials and Supplies)</th>
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<td>Heating &amp; Cooling Load Calcs.</td>
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<td>Member Education</td>
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<td>TOTAL</td>
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</tbody>
</table>

Conclusion

We encourage our members to be energy efficient by providing energy efficiency programs and information - thus helping to reduce their energy usage and our system demand. Carroll Electric Cooperative's mission statement expresses our commitment to our members: "We exist to serve our members with safe, reliable, and convenient electricity at the lowest possible cost."
Mississippi County Electric Cooperative, Inc.

Docket No. 08-046-RP
As one of the 17 members of Arkansas Electric Cooperative Corporation (AECC), Mississippi County Electric Cooperative is the smallest in number of meters and employees of the electric distribution cooperatives. However, our commitment to serve our members' needs is great and has been guided by principles and practices of sound management since our incorporation on September 28, 1938. It's a challenging but rewarding job for the employees and directors of the cooperative, who are anxious to continue to maintain the benefits of this cooperative way of life. The cooperative has been dedicated to providing safe, reliable, and affordable electricity to its membership. One of our most important goals is to remind our members that the cooperative is more than just a utility that provides electricity. The cooperative exists because of the concern and involvement of its consumer-members. One of those concerns is the efficient use of energy.


To accomplish our commitment to energy efficiency and conservation, Mississippi County Electric Cooperative’s demand response programs fall within three categories. These categories are Direct Control – Irrigation, Commercial and Industrial Voluntary Peak Avoidance and AECC Controlled Industrial Power Service - Interruptible.

**Direct Control - Irrigation**

Mississippi County Electric Cooperative offers three rate options to irrigation consumer-members, 2 ½ hour and 5 hour radio controlled rates and an uncontrolled rate. The rate is designed to give the farmer a monetary incentive for allowing his irrigation equipment to be cut off during peak consumption times thus saving added demand and the necessity for building additional generating plants and ultimately lowering the cost for all members. The uncontrolled rates include a kWh charge and an annual horsepower charge. By permitting the cooperative to install a radio-controlled device on their irrigation equipment, so that the Cooperative can control the operation of the irrigation load during periods of the Cooperative’s peak load conditions, the consumer-member will receive a credit per kWh of load controlled for control periods of 2 ½ hours or 5 hours for the period of June 1 to September 30. The credit cannot exceed 20% of the consumer-member’s cumulative bill for 2 ½ hour credits or 40% of the consumer-member’s bill for 5 hour credits for the same period before application of the credit. The credit is applied at the end of the period. In addition to the credit, the uncontrolled annual horsepower rate of 2012 MCEC - Energy Efficiency and Conservation APSC Reporting – Page #1
$34.41 is reduced to $24.22 for 2 ½ hour and $14.03 for 5 hour radio control. Of the 678 irrigation accounts connected in 2012 with a load of 31,463 kW, 593 were controlled. This demand response program shed approximately 27,966 kW off of AECC’s Rate-I summer peak demand. The total savings directly benefiting the consumer-members amounted to $2,939,785.92 for 2012. None of the figures above include the cost of new load management switches purchased each year by the cooperative, or the man hours to install new switches and check existing switches to be sure they are working properly.

**Commercial and Industrial Voluntary Peak Avoidance**
Mississippi County Electric Cooperative offers a special rate incentive to the Commercial and Industrial consumer-member to voluntarily reduce its demand during periods when an AECC summer peak(s) is imminent. This can be accomplished by installing their own generation or by shifting their production schedule, or by a combination of the two. The cooperative has eighteen (18) Commercial and Industrial consumer-members on this voluntary rate. In 2012, the cooperative had approximately 36188 kw that was either being voluntarily interrupted or was available for interruption through the Commercial and Industrial Voluntary Peak Avoidance program. In August 2012, the consumer-members on this rate voluntarily shed 23,353 KW off of AECC Rate 1 summer peak demand and saved consumer-members $2,454,867.

**AECC Controlled Industrial Power Service-Interruptible**
Mississippi County Electric Cooperative has seven Industrial accounts where load requirements equal or exceed 5,000kW, and where the consumer-member has agreed to interrupt all or a portion of his electrical load at any time upon demand by the cooperative, with at least three hours advance verbal or electronic notice. Interruptions are called for by Mississippi County Electric Cooperative’s wholesale power supplier, AECC. The consumer-member is credited $4.56 per kW of Average Demand per month as compensation for availability of the interrupted load. In 2012, Mississippi County Electric Cooperative had approximately 481,454 kW that was either being interrupted or was available for interruption through demand response. The cooperative’s demand response program for AECC Controlled Industrial Power Service-Interruptible saved consumer-members of the Mississippi County Electric Cooperative $24,265,281 in cost.

**Membership Education**

**Rural Arkansas Magazine**
Each member of Mississippi County Electric Cooperative is mailed a monthly issue of the Rural Arkansas Magazine, which provides informative articles with energy saving suggestions, tips, how-to guides and conservation topics that can be put to use in the member’s home or business. The two pages in the center of each magazine are actually produced by the cooperative. This gives us two 8 ½ x 11 inch pages monthly to inform our own members of various items of interest to them including energy efficiency and conservation education.
**Energy Survey**
At the request of the member, Mississippi County Electric Cooperative will perform an energy survey of the member’s residence or business to identify opportunities for improving energy efficiency that will help with lowering their energy usage.

**Energy Efficiency and Conservation Information**
Qualified member service representatives provide energy saving tips in response to member inquiries and high bill complaints. Member service representatives will also consult with members to further the member’s understanding of energy efficiency and conservation measures. The cooperative keeps printed material readily available on the front counter and in magazine racks in our foyer for easy access by the member. There is also a message area on the electric bill that is used as a brief reminder to the member to change their A/C filters and other information. This material is free of charge.

Web Site – [www.mceel.com](http://www.mceel.com)
We have combined all of our energy efficiency resources from Touchstone Energy Saver tools and Doug Rye Home Remedies to our Green Power program in one useful page accessible from the home page of our website. Members who want to learn more about how they can save money on energy costs can click and read more. The Touchstone Energy Saver Tools include an Energy Savings Home Tour, Light Bulb Energy Saver with a CFL calculator, Water Heaters Saver, Home Energy Saver Audit with calculator, Home Energy Savings Guide, Seal the Deal, Heating and Cooling Savings and a Commercial Energy Savings Guide. There are also many links throughout the website including the Touchstone Energy Kids Zone, Arkansas Public Service Commission, Department of Energy Efficiency & Renewable Energy, Department of Energy Information Administration and many more.

**New Home Construction Guidelines**
Mississippi County Electric Cooperative assists members who are building a new home with energy efficiency building guidelines.

**Marathon Water Heater Sales**
Mississippi County Electric Cooperative began its’ Marathon Water Heater Program because we believe it to be the most energy efficient water heater on the market. Because it is the most energy efficient water heater on the market, they are also expensive and there are not too many retail stores that stock them. For that reason, we decided to stock them at the cooperative and sell them to the public. Cooperative members can have the price of the water heater added to their electric bill in six installments over a six month period. We believe this service provides a way for our members to have access to this energy efficient model water heater they may not have had if they had to pay the full price upon purchase.

**Electric Cooperatives of Northeast Arkansas**
Mississippi County Electric, Clay County Electric, Craighead Electric, North Arkansas Electric and Woodruff Electric Cooperatives joined together to purchase internet, radio, television and print ads to relay a variety of messages related to the cooperatives including energy efficiency, conservation and safety. One of the sponsorships is of the Energy Alert on KAIT-TV which reminds area viewers that peak energy consumption conditions are approaching. The amount spent on this advertising varies
annually and is divided between the members of the Electric Cooperatives of Northeast Arkansas by number of meters served.

Scott Davis Magic
Scott Davis Magic show has presented at numerous area schools and civic organizations in Mississippi County Electric Cooperative’s service area. Davis adds humor as he brings a message of safety, energy efficiency and conservation to elementary students and adults alike.

Our Commitment
Mississippi County Electric Cooperative is committed to providing safe, reliable, efficient and affordable electric power to each of its members. This isn’t something new. We have been educating our members on the value of energy efficiency and conservation for many years. We have a vested interest since we are owned by the consumers we serve and because we are guided by a set of seven principles that reflect the best interests of those consumers. They also share in profits the cooperative makes in the form of capital credits, they are in a since our shareholders. They elect the directors who are responsible for making the decisions that directly affect the cooperative.

Energy Efficiency and Conservation APSC Reporting
We will be reporting at regular specified intervals to the APSC on programs designed to provide our members with information about energy efficiency and conservation, and our practices to promote energy efficiency and conservation throughout our service area.
Rich Mountain Electric Cooperative, Incorporated

Docket No. 08-047-RP
Rich Mountain Electric Cooperative Inc.
Mena, Arkansas
2012 Energy Efficiency and Conservation Report

Rich Mountain Electric Cooperative Incorporated was incorporated May 2, 1945 and energized the first lines on June 10, 1946. Rich Mountain Electric Cooperative, Inc. provides high quality electrical service to its owner consumers (members). System reliability records at RMEC demonstrate a commitment to deliver excellent service and to fulfill this service obligation to the members. Safety is the top priority. RMEC participates in the statewide safety program, assigns safety responsibilities to qualified personnel, and provides programs on skill and knowledge improvement for employees through continuing education. The service area of Rich Mountain Electric Cooperative extends from the scenic Ouachita Mountain range on the North in Polk County, into the typically hilly and tree-covered terrain in Howard County to the South. The service area extends a short distance into Montgomery County on the east, Sevier County on the southwest, and McCurtain and LeFlore Counties in Oklahoma on the west.

Rich Mountain Electric Cooperatives system is made up of Residential and Small Commercial loads. Ninety percent (90%) of the total KWH sold and ninety one percent (91%) of the total revenue from the sales of electricity comes from the Residential sector. Ten percent (10%) of the total KWH sold and nine percent (9%) of the total revenue from the sales of electricity comes from the Small Commercial sector. Rich Mountain Electric Cooperative has eight thousand and sixty-eight (8,219) Residential and four hundred and thirteen (415) Small Commercial meters in service and maintains an average annual growth of two percent (2%). At this time there are no Large Commercial or Industrial loads on RMECs’ system.

Tourism has a strong positive impact on the economy of the County areas, which embrace scenic mountains, numerous streams and small rivers. This environment supports the location of two popular state parks, thousands of acres of U.S. Forest land, and private forests open to the public. Residential development in the area owes a substantial measure of its success to the “fallout” from tourism. Many who tour the area are retirees who are influenced to locate here after becoming impressed with the beauty, climate and relaxed lifestyle that area residents enjoy. It is estimated that retirees occupy more than thirty-six percent (38%) of the new residences constructed in the Polk County area.

Rich Mountain Electric Cooperative has supported, assisted with, and actively participated in many programs that have and will continue to improve the quality of life for its members and other citizens in its service area. With a system made up of primarily residential load and a large percentage of members on fixed incomes, energy efficiency and conservation in not a new form of practice for RMEC or any other Electric Cooperative in the State of Arkansas. So with this in mind, we are proud to present our report to the Commission.

We would like to begin this report by stating the fact that after the 1979 energy crisis the Cooperatives in Arkansas began working forward to do everything possible to protect its Members from such a crisis. Cooperative leaders felt that a worse crisis would be inevitable unless they started changing the vastly increasing loads and dependencies on foreign oil. Drastic measures were made to ease as much of the future energy cost burden to the membership as possible. Some of these drastic measures included cash incentives that were given to consumers who installed high efficiency heat pumps and high efficiency water heaters (1987-1992) and
even more so, the operation of the Clyde T. Ellis Hydroelectric Generation Station in 1988 which was just the first of three.

Rich Mountain Electric Cooperative had been involved in educational programs for its Members and community since it was incorporated in 1945. With the advancements in technology, continuing education has been a crucial role in the relationship we maintain with our Members. Rich Mountain Electric Cooperatives’ Energy Efficiency and Conservation Efforts are split in 15 primary components;

1) **Website**
   Rich Mountain Electric Cooperatives website promotes safety, energy efficiency, Cooperative principles and the use of green power generation. On average we will have four members either come in to the office or call to enquire about green power generation. The cost to RMEC for this service was approximately $12,000 for 2012

2) **Newspaper adds**
   Rich Mountain Electric Cooperative puts monthly ads in the Mena Star and the Pulse. These ads contain information on safety and energy efficiency. The cost to RMEC for this service was approximately $22,000 for 2012

3) **Radio ads**
   Rich Mountain Electric Cooperative puts monthly ads on the Mena and Nashville radio stations. These ads contain information on safety and energy efficiency in addition to the Doug Rye show. The cost to RMEC for this service was approximately $5,000 for 2012

4) **Rural Arkansas magazine**
   Rich Mountain Electric Cooperative sends out to each of its members a copy of the Rural Arkansas magazine. The Rural Arkansas is printed through our state wide affiliate, Arkansas Electric Cooperative. The Rural Arkansas for Rich Mountain Electrics members is designed and printed to fit the specific needs of our service territory. The Rural Arkansas magazine contains tips and information on safety, energy efficiency in addition to the Doug Rye page, current affairs and a host of other information. The cost to RMEC for this service was approximately $27,000 for 2012

5) **Educational brochures**
   Rich Mountain Electric Cooperative has hand out brochures available on energy efficiency at each of its two offices. These brochures include Home Tightening, Water Heaters, Home Heating, 30 Simple things you can do to Save Energy and Money, Home Energy Projects, energy savers and Major Home Appliances. These were furnished to Rich Mountain Electric by Arkansas Electric Cooperative Corporation at no cost to Rich Mountain Electric.

6) **Marathon water heater sales**
   Rich Mountain Electric Cooperative sells the Marathon water heaters because we believe they are the most energy efficient water heater on the market today. For a typical single family home, the water heater accounts for thirteen percent (13%) of the members’ Annual energy bill. Low cost to no cost to Rich Mountain Electric.
7) **Civic programs**

Rich Mountain Electric Cooperative has supported, assisted with, and actively participates in many programs that have and will continue to improve the quality of life for its members and other citizens in its service area. RMEC personnel continue to work with the area chambers of commerce by serving on boards of directors and on various special industrial development and tourism committees of those organizations. RMEC recognizes the importance of an area’s infrastructure to the process of enticing new business and industry, as well as other improvements to the quality of life for its citizens. On these programs we educate the public on areas of safety, energy efficiency and green power. The time for these projects is volunteered by Cooperative staff at low cost to no cost to Rich Mountain Electric.

8) **Home visits to do energy audits and recommendations made over the phone**

RMEC offers home heating and cooling energy surveys by trained staff members. Detailed heat loss calculations, equipment and insulation advice, and recommendations are offered to homeowners or prospective home-owners and general contractors. Analysis of consumer usage is also available. The cost to RMEC for this service was approximately $54,000 for 2012.

9) **Rural water systems**

The cooperative has supported these efforts by offering organizational and operational assistance. With the well water in most our service territory containing large parts of iron and being extremely hard water, hot water heater elements going bad has been a constant. Generally, the bottom element will go bad due to iron build up thus causing the lower elements to have to work harder to control the water temperature. Another problem comes from the hard water eating holes in the foot valves in the well pumps which cause the pump to run constantly. These problems won’t generally be noted until the members receive an increased light bill. So by the rural water systems coming in and installing better water for the rural areas on our system, they have helped our members to receive safer, cleaner water and a bonus of helping them conserve energy and maintenance cost from water heaters and well pumps. The cost to RMEC for this service was approximately $4,000.00 in 2012.

10) **Donating energy efficient electric ranges to the public schools**

Rich Mountain Electric Cooperative has six public schools in its service territory. Every year one of the six schools receives a new energy efficient electric range from RMEC. RMEC delivers the range to the school talks to the schools home economic teachers about stressing to their students the fact that when they are future homemakers they should look at energy efficient appliances before purchasing. The ranges are furnished by Arkansas Electric Cooperative Corporation so the labor to deliver the range and talking to the teachers will be the only charges. The cost to RMEC for this service was approximately $480.00 for 2012.

11) **Speech contests sponsored by the Electric Cooperatives of Arkansas**

A speech contest, sponsored by the electric cooperatives of Arkansas is held each year for high school juniors. Three winners from RMEC’s service area are sent to tour Washington DC with similar winners from the service areas of other state cooperatives. RMEC shares the expense of its three-area winners with the statewide cooperative. Topics such as Energy Efficiency Arkansas are discussed with the students which will not only teach these students,
but will also give the students the knowledge they need to teach others. Low cost to no cost in 2012.

12) Electrical safety and efficiency training for grades 1 thru 6
Each year we go to the public schools and put on an electric safety and energy efficiency program. Most of this centers around safety because of the age group. For energy efficiency we basically tell them to turn the light switch off when they leave a room and teach their parents to do the same. The cost to RMEC for this service was approximately $2,000 in 2012.

13) Lighting athletic fields and recreational parks
Recreation is an often overlooked infrastructure item important to an area’s quality of life. One of the Cooperative’s contributions to many area communities’ recreational activities is the assistance given to lighting athletic fields and recreational parks. The Cooperative generally assists in the lighting design. RMEC also has donated labor and use of construction equipment to assist with the lighting installations. We advise them to take the money we save them and invest it in energy efficient lighting systems. The cost to RMEC for this service was approximately $1,000.00 in 2012.

14) Special rate for 200KWD loads
Rich Mountain Electric Cooperative’s Commercial and industrial Rate offers large saving incentives to members who install a 200 kW load or greater. These saving incentives are received by demand savings. Installed measures must have the potential to go off line or be self-sponsored during the peak hours of the summer months. Rich Mountain Electric Cooperative presently has two (2) members that qualify for this rate. These two services help reduce Rich Mountains summer demands by 448 kWd and result in an annual savings to Rich Mountains membership of $50,000.00.

15) Fair booth
Rich Mountain Electric Cooperative sets up a booth at the Polk County Fair each year. At this booth staff volunteers talk to the community about safety, energy efficiency and answer any questions or resolve any concerns that anyone might have about their Cooperative. We have a light bulb display that shows the difference in the usage of a florescent light bulb versus a conventional bulb, along with the difference of a 60w bulb and a 100w bulb. We also have brochures on energy efficiency and safety available at the booth. The time for these projects is volunteered by Cooperative staff, the booth materials and supplies were $5,200 for 2012.

16) Coordinated programs with AECC
Rich Mountain Electric Cooperative has supported, assisted with, and actively participates in many programs that have and will continue to improve the quality of life for its members and other citizens in its service area. These programs include Frontier and Associates at a cost to RMEC of $27,572. Energy Efficiency Arkansas at a cost to RMEC of $139,215. Arkansas Home Builders at a cost to RMEC of $30,215, which adds up to a total combined cost to Rich Mountain Electric for the Coordinated programs of $196,788 for 2012.
The investment Rich Mountain Electric made in 2012 for Energy Efficiency Programs was $329,438.00. The Cost Ratio of our Energy Efficiency programs to our Operating Margins for the year 2012 was 1.44 or 144 percent. We have estimated that the EE Programs saved Rich Mountain Electrics members 9,378,069 kWh in 2012, which will result in the savings of $482,971 from kWh purchased from AECC. The total kWh purchased in 2012 was 140,218,373. 2013’s predicted growth from new installations is 2%. 2% times 140,218,373 kWh is 2,804,367. 140,218,373 kWh plus 2,804,367 kWh equals 143,022,740 kWh to be purchased in 2013. 143,022,740 kWh less the estimated savings from our EE Programs of 9,378,069 kWh equals 133,655,671 kWh to be purchased in 2013.

The estimated result indicates that Rich Mountain Electric Cooperative can maintain its two (2.0) percent growth in new installations with a conservative estimated decrease of more than five (5.0%) percent decrease in kWh’s purchased. The total estimated savings to RMEC from direct results of the above mentioned components for 2012 was approximately $530,000.00. We have also estimated a savings of $1,355,000 over the past six years due to our EE Programs. This equates to over 25,000 megawatt hours that we did not have to purchase over the last six years due to our EE Programs.

**Summary**- Rich Mountain Electric Cooperative is a voluntary organization, open to all persons able to use its services and willing to accept the responsibilities of membership, without gender, social, racial, political or religious discrimination. We are a democratic organization controlled by our members, who actively participate in setting policies and making decisions. Our elected representatives are accountable to the membership. Rich Mountain Electric cooperatives, members have equal voting rights (one member, one vote). Our Members contribute equitably to, and democratically control, the capital of our cooperative. RMEC provides education and training for its members, elected representatives, management and employees so we can contribute effectively to the development of our cooperative. RMEC serves its members most effectively and strengthen the cooperative movement by working together through local, national, regional and international structures. While we are focusing on our member needs, we work for the sustainable development of our communities through policies accepted by our members. With this in mind, Rich Mountain Electric Cooperative is proud to conclude its Energy Efficiency and Conservation Efforts Report to the Commission.
C & L Electric Cooperative Corporation

Docket No. 08-048-RP
C & L Electric Cooperative Corporation
Star City, Arkansas

2012 Energy Efficiency and Conservation Report

C & L Electric Cooperative Corporation was incorporated in 1938. Since then, C & L Electric has been dedicated to providing safe, reliable and affordable electricity to its membership. In 2012, C & L Electric served 21,713 meters over a network of 4330 miles of service lines, in 8 counties.


Membership Education

Each member of C & L Electric receives a monthly issue of Arkansas Living Magazine.

Every issue of the magazine provides energy savings suggestions as well as energy efficiency tips and various other conservation topics.

C & L Electric sponsors the Doug Rye national syndicated radio program, “Home Remedies” on local radio stations that can be heard throughout our service area. Doug Rye’s radio program teaches listeners how to save money by making their home more energy efficient.

Energy Audit

At the request of a member, C & L Electric will perform an energy survey or in depth Energy audit of the member’s residence or business to identify opportunities for improving energy efficiency at that location.

In 2012 C&L Energy Efficiency auditor performed 97 account phone audits, 5 Infrared camera audits & 1 Blower Door Audit. He also participated in a light audit in a local garment factory.

He also conducted 8 energy efficiency classes in 7 counties to low income members seeking assistance from various agencies. He also discussed various energy efficiency topics with over 500 members. He also conducted 8 presentations to the local high school east lab program.
Member Services

Consumer account representatives also provide energy savings tips in response to member inquiries and high bill complaints. C & L Electric provided educational information through printed pamphlets available to customers. Examples of these are Energy Efficiency in Manufactured Home, Marathon Water Heaters, Air Source Heat Pump, Geothermal Heat Pumps, Compact Fluorescent Lamps and Green Power. Educational DVD’s and coloring books for school children.

C & L Electric participated in the Doug Rye Model Home Program assisting members in constructing new homes following energy efficiency building guidelines.

C & L Electric participated in the House Utilities Permanent Subcommittee of Insurance and Commerce, discussing energy bills, assistance, levelized billing, energy efficiency and conservation.

C & L Electric participated with the Electric Cooperative of Arkansas in the Energy Efficiency Arkansas program. A total of $139,215.20 was invested. C & L’s portion was $6,317.16.

C & L Electric participated with the Electric Cooperatives of Arkansas and Frontier Associates, LLC for the Arkansas Deemed Savings Report at a cost of $27,572.44.

C & L Electric provides E-Business and E-Pay to its members on its web site clelectric.com. C&L Electric currently has 1096 participants on E-Pay. Links to Touchstone Energy savings tips, Kids Zone and other Energy Savings advice is provided.

Load Control

C & L Electric has 71 irrigation accounts participating in the load control program.

Those who participate allow the cooperative to install a switch on their irrigation pumps that can be controlled when Arkansas Electric Cooperative Corporation is approaching a monthly demand peak. In 2012 this program had the potential to avoid approximately 1712 KW of demand which resulted in a refund to members of $23,679.00.
Arkansas Valley Electric Cooperative Corporation

Docket No. 08-050-RP
Energy Efficiency 2012 Report

Summary

This report is provided to the Arkansas Public Service Commission for review of Arkansas Valley Electric Cooperative Cooperation’s (AVECC) energy efficiency programs, services and measurements thereof.

In 2012 AVECC grew its energy efficiency outreach and programs through a variety of community education presentations, broadcast media messages, web based information, energy audits and other means. AVECC also continued its efforts to reduce overall energy consumption by members through no-cost energy audits and consults to residential, agricultural and commercial members.

AVECC worked with various government agencies in 2012 in order to provide information to the membership on programs that provide tax credits, rebates and funding for energy efficiency products and renewable energy programs.

Through partnerships with Touchstone Energy Cooperative and Arkansas Electric Cooperatives Corporation, AVECC added new programs and expanded existing efforts to maximize energy efficiency marketing and education in 2012.

Energy Efficiency Programs and Outreach

- Energy Expert Television Segments.

In February of 2012 AVECC begun airing five-minute video segments on KFSM (Fort Smith / Fayetteville) during the Sunday Morning News. Each five-minute segment focused on practical
solutions for reducing residential energy consumption. The segments were written and hosted by the AVECC Member Service Manager. Segments often featured guest with information and expertise on various energy efficiency topics. New segments aired every other week through the year and are planned to continue through 2013.

- AVECC Energy Showcase Home

The Showcase Home held April 14 – 22 was done in conjunction with the Annual Fort Smith Parade of Homes. The home featured the latest in residential energy efficiency and environmentally sustainable features including slab duct work, solar assist water heating, low e windows, rain collection system, automated energy management system and more. Doug Rye broadcast his nationally syndicated radio program “Home Remedies” live at the opening day of the event and provided energy consultations to visitors throughout the day. The seven-day event was open to the public at no charge. Over 1,800 people toured the home.

- Complete Energy Audit (Blower Door / Duct Blaster Testing and Thermographic Analysis)

In order to provide a more valid and standardized method of audit AVECC continued to employ a full time staff Energy Auditor and invested in Building Performance Institute (BPI) along with Minneapolis Blower Door training and certification for an additional employee in 2012. AVECC’s complete energy audit utilizes BPI practices and techniques including blower door, duct blaster and infrared testing equipment to determine heating and cooling loss in existing structures that lead to high-energy consumption. The analytical data is assembled into a report that outlines opportunities for the member to reduce energy consumption and save on utility bills. AVECC offers this as a no-cost service to all residential and small commercial members.

- Basic Energy Audit

The basic audit is utilized for members with time constraints that would preclude a complete audit or when a member is concerned with abnormally high usage and prefers not to have a complete audit. This method generally involves a walkthrough of the member’s property in
order to locate and isolate appliances, pumps, motors or HVAC units that may be compromised and leading to high electricity consumption. Recommendations for other energy efficiency measures are made when applicable.

In both the complete and basic audit, the member is given a compact fluorescent lamp and literature that details cost and kilowatt consumption benefits of CFL lighting. Members also receive Touchstone Energy's, *101 Easy Ways to Save Energy and Money* booklet.

All personnel directly involved in energy efficiency programs received over 100 hours each of continuing education related to energy efficiency, audit methods, renewable resources and new related technologies in 2012.

*Exhibit A*

**Touchstone Energy’s Together We Save Campaign**

AVECC devoted a great deal of marketing resources toward “Together We Save” (TWS) in 2012. The web based tool is featured on the AVECC website. TWS features more than a dozen energy-efficiency interactive web applications linked to a virtual home tour, all designed to encourage co-op members to take energy-saving actions now. Plus Touchstone Energy TV, showcasing energy-efficiency videos and the Energy Saving Forum, where cooperative members from across the nation can post their own energy saving success stories and learn more information on how they can lower their energy bill. TWS utilizes AVECC actual rates to allow members to estimate cost savings through energy efficiency measures.

*Together We Save, Exhibit B*

AVECC utilizes several other web based energy efficiency tools and informational resources on avecc.com including programs for lighting energy usage calculation, Energy Star information and renewable energy resource information. A new sub-website was developed in 2012 with an exclusive focus on efficient and renewable energy. MyEnergy is directly accessible through the main AVECC website.
AVECC launched a Facebook page in 2012 that provides weekly energy efficiency tips and information.

Exhibit C

E-Newsletter

AVECC publishes a monthly electronic newsletter that focuses on residential energy efficiency articles. Each issue is posted on the AVECC website. Arkansas Valley also utilizes a third party email management company to distribute the newsletter to members (approximately 700) who request the service.

Arkansas Living Magazine

All AVECC members receive a monthly copy of Arkansas Living magazine. The center-page information is specific to AVECC members. During 2012, energy efficiency articles included, energy star appliance information, energy efficiency makeover contest and energy efficiency web tools.

Energy Efficiency Marketing / Advertising

In addition to the previously mentioned “Energy Experts” television segments, AVECC increased sponsorship of energy efficiency related television, radio and print advertising in 2012. AVECC also utilized these media to create a greater awareness of the Together We Save Campaign, energy audit programs and provide simple energy efficiency tips.

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Energy Efficiency Education

AVECC conducted or participated in various energy efficiency programs targeted to grades K – 12 in 2012. Energy efficiency didactic materials were also made available to numerous area schools.

AVECC continued to work with The University of Arkansas – Fort Smith and Arkansas Tech University – Ozark Campus through guest lecture series on topics relating to energy efficiency. Lectures were presented to business and technology related classes. AVECC also lead the Arkansas Energy Office and Arkansas Home Builders "Energy Code" classes in Fort Smith and Ozark in 2012.

School Programs

2012

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<td>Mulberry</td>
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**Doug Rye Energy Efficiency Seminars**

AVECC in conjunction with the Greater Fort Smith Homebuilders Association hosted two energy efficiency seminars featuring Doug Rye during the Annual Fort Smith Home Show at the Fort Smith Convention Center. AVECC also had booth space during the three-day show where energy efficiency information and literature were provided to attendees. AVECC also held an energy efficiency information day at the Van Buren office featuring Doug Rye. Members and the general public could discuss home energy issues with Mr. Rye in person.

**Energy Efficient Marathon and GE GeoSpring Water Heaters**

AVECC continued informing members of the benefits of energy efficient water heating by promotion and distribution of two high efficiency electric water heaters. In 2012 AVECC distributed 42 Marathon and one GeoSpring water heaters to our membership. AVECC has zero margin of profit on these products when sold to members.

All totals, Exhibit D
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<td>$44.40</td>
<td>$0.00</td>
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<td>############</td>
<td>Marcus Berry</td>
<td>Blower Door</td>
<td>$300.00</td>
<td>$11.10</td>
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<td>############</td>
<td>Cecil McDaniel</td>
<td>Energy Audit</td>
<td>$150.00</td>
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<td>############</td>
<td>Ladonna Youngblood</td>
<td>Energy Audit</td>
<td>$150.00</td>
<td>$44.40</td>
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<td>############</td>
<td>Tou Joe Xiong</td>
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<td>Carmie McChristian</td>
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<td>12/3/2012</td>
<td>Laquita Parks</td>
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<td>IR Level II Certification Class</td>
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<td><strong>Totals</strong></td>
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<td></td>
<td>$27,175.00</td>
<td>$5,197.38</td>
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<td>$36,082.38</td>
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### Together We Save Deemed Savings Report
Arkansas Valley Electric Cooperative

<table>
<thead>
<tr>
<th>Year</th>
<th>Expenses</th>
<th>Website Visits*</th>
<th>Total Co-op Deemed Savings*</th>
<th>Pages/Visit*</th>
<th>Avg. Time*</th>
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<tbody>
<tr>
<td>2009-2010</td>
<td>$30,000</td>
<td>151</td>
<td>$57,225.07</td>
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<tr>
<td>2011</td>
<td>$30,000</td>
<td>62</td>
<td>$11,799.00</td>
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<td>2012</td>
<td></td>
<td>95</td>
<td>$19,319.00</td>
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<tr>
<td>Totals</td>
<td>$60,000</td>
<td>308</td>
<td>$88,343.07</td>
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*Figures provided by www.togetherwesave.com

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<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>Total</th>
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<tr>
<td>Estimated Kwh Savings</td>
<td>602,369</td>
<td>124,200</td>
<td>203,358</td>
<td>929,927</td>
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<td>Estimated BTU Savings</td>
<td>2,055,885,936</td>
<td>423,894,600</td>
<td>694,060,495</td>
<td>3,173,841,031</td>
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Average Savings/Visitor | $378.97  | $190.31  | $203.36  | $286.83  |
### 2012 Website Energy Efficiency Hits
Arkansas Valley Electric Cooperative

<table>
<thead>
<tr>
<th>Month</th>
<th>AVECC New Visitors</th>
<th>% New Visits</th>
<th>AVECC Total Visits</th>
<th>*AVECC E.E. Visits</th>
<th>Willie's World</th>
<th>Total</th>
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<tbody>
<tr>
<td>Jan-12</td>
<td>2454</td>
<td>50.59%</td>
<td>4851</td>
<td>123</td>
<td>13</td>
<td>136</td>
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<tr>
<td>Feb-12</td>
<td>2410</td>
<td>48.46%</td>
<td>4973</td>
<td>120</td>
<td>14</td>
<td>134</td>
</tr>
<tr>
<td>Mar-12</td>
<td>2304</td>
<td>48.13%</td>
<td>4787</td>
<td>115</td>
<td>34</td>
<td>149</td>
</tr>
<tr>
<td>Apr-12</td>
<td>2246</td>
<td>47.49%</td>
<td>4729</td>
<td>112</td>
<td>19</td>
<td>131</td>
</tr>
<tr>
<td>May-12</td>
<td>2650</td>
<td>48.43%</td>
<td>5472</td>
<td>133</td>
<td>14</td>
<td>147</td>
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<tr>
<td>Jun-12</td>
<td>2855</td>
<td>49.83%</td>
<td>5730</td>
<td>143</td>
<td>35</td>
<td>178</td>
</tr>
<tr>
<td>Jul-12</td>
<td>3138</td>
<td>49.99%</td>
<td>6277</td>
<td>157</td>
<td>24</td>
<td>181</td>
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<tr>
<td>Aug-12</td>
<td>2823</td>
<td>46.97%</td>
<td>6010</td>
<td>141</td>
<td>34</td>
<td>175</td>
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<td>Sep-12</td>
<td>2698</td>
<td>48.68%</td>
<td>5542</td>
<td>135</td>
<td>12</td>
<td>147</td>
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<td>Oct-12</td>
<td>2725</td>
<td>49.79%</td>
<td>5473</td>
<td>136</td>
<td>8</td>
<td>144</td>
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<tr>
<td>Nov-12</td>
<td>2434</td>
<td>47.23%</td>
<td>5153</td>
<td>122</td>
<td>54</td>
<td>176</td>
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<tr>
<td>Dec-12</td>
<td>2702</td>
<td>48.74%</td>
<td>5544</td>
<td>135</td>
<td>14</td>
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<td>Totals</td>
<td>31439</td>
<td>64541</td>
<td>1572</td>
<td>275</td>
<td></td>
<td>1847</td>
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</tbody>
</table>

New Vs. Returning Visitors =
48.71% New
51.29% Returning

** Deemed Savings = $375,588.81

Estimated Kwh Savings 3,953,566
Estimated BTU Savings 13,493,522,168

* Based on 5% of AVECC new visitor hits
** Based on an average of $286.83 from TWS Website

$19,319.00 95 $203.36

Data provided by Apogee Interactive (website provider) through Google Analytics.
# 2012 AVECC Energy Efficiency Report

## Arkansas Valley Electric Cooperative

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
<th>Man Hours</th>
<th>Man Hours $</th>
<th>Mileage</th>
<th>Mileage $</th>
<th>Deemed Savings</th>
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<tbody>
<tr>
<td>Audits/Blower Doors</td>
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<td>427</td>
<td>$21,350.00</td>
<td>8565</td>
<td>$4,710.75</td>
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<tr>
<td>Training</td>
<td>3</td>
<td>104</td>
<td>$5,200.00</td>
<td>800</td>
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<td>Consultations</td>
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<td>$0.00</td>
<td>$0.00</td>
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<td>Other</td>
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<td>0</td>
<td>$0.00</td>
<td>0</td>
<td>$0.00</td>
<td>$0.00</td>
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</table>

**Total**

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>147</td>
<td>537.5</td>
<td>$26,875.00</td>
<td>9365</td>
<td>$5,150.75</td>
<td>$24,500.00</td>
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**CFL's & Assoc. Costs**

<table>
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<th></th>
<th>$3,710.00</th>
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<tbody>
<tr>
<td>Touchstone</td>
<td>$10,500.00</td>
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<tr>
<td>AVECC Website</td>
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</tr>
<tr>
<td>Media / Advertising</td>
<td>$53,000.00</td>
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</table>

**Grand Total**

|             | $101,235.75 |

**Estimated Kwh Savings**

|             | 257,895    |

**Estimated BTU Savings**

|             | 880,194,737|

**Average Savings**

|             | $199.19    |
Clay County Electric Cooperative Corporation

Docket No. 08-051-RP
Clay County Electric Cooperative Corporation

2012 Energy Efficiency Programs Report

Clay County Electric Cooperative Corporation, CCECC, adheres to the seven guiding principles of cooperatives. One of those is Education, Training and Information. Cooperatives provide education and training for their members, elected representatives, managers and employees so they can contribute effectively to the development of their cooperatives. They inform the general public, particularly young people and opinion leaders, about the nature and benefits of cooperation. Energy Efficiency is one key area that CCECC is committed to providing education, training and informing our members, employees and general public. CCECC promotes Energy Efficiency through the distribution and resale of energy efficient products. Our members are informed and educated through the distribution of the Arkansas Living Magazine through our statewide office along with the distribution of our monthly newsletter Member Matters at each of our local offices. The general public is educated and informed through our cooperative website www.claycountyelectric.com, advertisement via television and radio, and community seminars or meetings. Following is a breakdown of activity during 2012 that further enhanced our ongoing commitment to energy efficiency to not only benefit our members but also help improve the communities we live and work in.

CCECC Website Content www.claycountyelectric.com
Apogee HomeEnergySuite
HomeEnergyCalculator
Lighting Calculator
Heat Pump Calculator
Television Calculator
Appliance Calculator
Kid’s Korner
Interactive EnergyHome
Fundamentals of Electricity
Home Energy Library
Geothermal Heat Pump Systems
Power Quality
Touchstone Energy “Online Energy Audit”
Approximately 1/4 of our website is dedicated to energy efficiency
CCECC Energy Efficient Product Promotion
CFL bulbs, surge protection, switch and outlet draft sealers, Marathon and GE GeoSpring water heaters are available for resale. GE GeoSpring and Marathon water heaters are two of the most energy efficient water heaters on the market today. CCECC sold one GeoSpring Water Heater and thirty Marathon water heaters through our local offices in 2012.

CFL bulbs were distributed at our annual meeting.

CCECC Sponsors Doug Rye's Radio Show
"Home Remedies" radio show hosted by energy efficiency expert Doug Rye is aired on our local radio stations in two counties.

CCECC Promotion in Schools & Community Events
CCECC also provides upon request an electrical safety and conservation demonstration. We provided this demonstration for Black River Technical College's summer program Kid's College, Maynard public schools, Maynard Fire Department (Pioneer Days), AG Headquarters Peanuts and Farm Safety Day (Randolph County Fairgrounds).

CCECC Advertisement
CCECC promotes energy efficiency through print, radio and television advertisement and educational materials. Each month all members receive the Arkansas Living Magazine containing many educational articles. Inside the magazine CCECC has a minimum of two pages dedicated to our individual promotions. Approximately 27% of this space was dedicated to energy efficiency. Our cost for this was approximately $10,095. We continue to distribute our monthly newsletter Member Matters through our offices. Each issue contains energy efficiency tips or educational articles on energy efficiency. CCECC sponsors radio advertising with an estimated 1/3 of this dedicated to energy efficiency. Our total cost for radio time in 2012 was $9,874. We also collaborate with the other electric cooperatives in northeast Arkansas to have energy saving tips and energy alerts placed on our local television station. Our portion of this cost was $3,175. Educational energy efficiency brochures on topics such as CFL Bulbs, Geothermal Heat Pumps, 100 Low Cost No Cost Home Energy Savings Measures, Marathon Water Heaters, GeoSpring Water Heaters and Air Source Heat Pumps are distributed in our office lobbies, at community meetings and county fairs.
CCECC Building Energy Surveys
Energy Surveys are provided upon member’s requests. The member is provided with a sheet explaining the basic kilowatts consumed by many different home appliances. CCECC uses an infrared thermometer to identify hot or cold spots inside the structure. We also have an infrared camera to assist and improve our evaluation and have two employees certified. Our automated meter reading (AMR) system allows us to provide a graphic description of their hourly energy consumption. We do an overall outside check of the building envelope and provide energy saving building techniques and other efficiency information.

In 2012 CCECC conducted six Residential Surveys. In addition to the residential surveys, one small commercial survey was completed. The small commercial survey utilized data to assist with energy efficiency lighting upgrades while attempting to control the demand side of their billing component.

CCECC Load Control Program
We have an aggressive Load Control program on irrigation wells. During the peak months of 2012, our load management system reduced our peak load by approximately 3,000 kW with an average load reduction of 1,547 kW over the four summer months. The maximum load reduction was 4.9% of the total system KW load. At today’s wholesale rate the Load Control Program provided $262,581 savings on the wholesale cost of power. This was an increase in savings of approximately 8% compared to 2011. This reduction in load further prolongs the need for additional generation capacity.

Energy Efficiency Expenditures Initiated by AECC
In addition to CCECC’s individual efforts, Arkansas Electric Cooperative Corporation’s Rates and Forecasting Department initiated energy efficiency expenditures on behalf of the member cooperatives, which we are a part of. These expenditures were for: (1) the electric cooperatives’ contribution for updating Frontier and Associates, Inc.’s Deemed Savings factors - $27,572.44; (2) the electric cooperatives contribution to the Arkansas Energy Office for Energy Efficiency Arkansas information and education initiatives - $139,215.20; and (3) the electric cooperatives contribution to the Arkansas Home Builders for conducting “Energy Code” classes to enhance the understanding of Arkansas home builders with regard to applicable energy efficiency codes - $30,000.

This concludes Clay County Electric Cooperative Corporation’s report on Energy Efficiency programs and practices conducted in 2012 to provide our members and the communities we live in with information about energy efficiency and practices to promote energy efficiency throughout our service territory.
Craighead Electric Cooperative Corporation

Docket No. 08-052-RP
Craighead Electric Cooperative Corporation

By Monty Williams, Vice President of Marketing and Communications

2012 Energy Efficiency and Conservation Efforts

Cooperative Philosophy on the Efficient Use of Electricity

Craighead Electric Cooperative has always tried to do what is in the best interest of the member, which includes promoting energy efficiency when possible. The co-op’s initial focus for its energy efficiency efforts was on helping the individual member obtain direct savings in electrical usage by installing energy efficient measures that would have an immediate impact on the monthly bill. Because Craighead Electric is a cooperative with the mission of benefitting its members, in contrast to the detached stockholders, energy efficient promotions that cut kilowatt-hour sales benefit the member directly by saving them money.

A secondary benefit of Craighead Electric promoting energy efficiency is the avoidance or delay of new power plant construction. This also results in a savings to the member-consumer, but has a long-term benefit in the form of holding down rates that would pay for the capital investment required for a new power plant.

Delaying or avoiding capital investment in new power plants can also be achieved by shifting electricity consumption to off-peak periods. Craighead Electric has been very successful in this area with its irrigation load control program and its incentive rates for large industrials. These programs allow for much more efficient allocation of generation assets, thus delaying rate increases that usually accompany power plant construction.

Craighead Electric offers a variety of energy efficiency related programs, and services to its Members. Craighead Electric’s programs and services are included in this report.

- Member Education
- Programs & Services
- Load Management Programs
- Continuing Education for Employees
- Estimated Deemed Savings
- Energy Efficiency Expenses
**Member Education**

*Arkansas Living Magazine*

The *Arkansas Living* magazine is mailed to each cooperative member each month. Approximately 22% of the available space for 2012 was dedicated to energy efficiency education. Craighead Electric’s cost for this 22% was $20,161.00 and Labor costs of $7522.00.

*Newspaper Advertisement*

The newspaper ad space bought by CECC in 2012 was directed toward energy efficiency education amounted to $756.00.

*Radio Advertisement*

Craighead Electric pays directly for radio ads to relay a variety of messages related to the co-op. CECC sponsors the “Home Remedies Radio Show” host by Doug Rye and advertising for the Doug Rye Seminars. In 2012, approximately 100% of the ads were directed towards energy efficiency education for a total of $3200.00.

*Television Advertisement*

Craighead Electric pays directly for TV ads to relay a variety of messages related to the co-op. In 2012, approximately 100% of those ads were directed toward energy efficiency education for a total of $4224.00. The “ToGetherWeSave” ads were used. These ads were produced through Touchstone Energy Cooperatives. The Touchstone Energy Cooperatives brand represents a nationwide alliance made up of more than 700 local, consumer-owned electric cooperatives in 46 states. The ads ran throughout the year and a link on KAIT TV8’s website directs anyone to our website for information about energy efficiency.

During peak usage periods during the summer an “Energy Alert” light bulb icon will appear on the TV screen along with a ticker scrolling to inform members to curtail usage of non-essential appliances. This helps to reduce the summer peak demand. This is at no cost to the cooperative; it is a public service announcement through the television station.

*Member Newsletter*

The member newsletter, *Hot Lines*, is mailed to each cooperative member bi-monthly. Approximately 38% of the available space for 2012 was dedicated to energy efficiency education. Craighead Electric’s cost for this 38% was $6312.00.

*Bill Message*

Each month an energy efficient tip of the month is added to the message block on each member’s electric bill.

*Energy Efficiency Home Makeover*

We received 123 applications for the EE Home Makeover. (These costs are included in the Home Energy Audit section). The labor and transportation cost in choosing a winner and promoting live on local radio stations and delivering the runner up water heater was estimated at $971.00.

*Fair & Expo Educational booths*

Craighead Electric participates annually in several expos and fairs in the communities we serve. At these events we hand out information about CECC and energy efficient information and
recommendations. These are a few that we participated in 2012: Lawrence County Chamber of Commerce Business Expo, and Northeast Arkansas District Fair. Several thousand individuals visited the booths throughout the events. Cost for the booth rental space was approximately $270.00. The labor costs were estimated to be $1549.00.

Doug Rye Energy Efficiency Seminars & Model Home
CECC sponsored four (4) Doug Rye Energy Efficient Seminars, one (1) model home open house, and Doug Rye Seminar during the “Paint the Town Green” week with the Jonesboro Chamber of Commerce. These seminars are free to the public and are held in the evenings and mornings. Over two hundred sixty five (265) home owners, builders, contractors, and students attended the seminars and model home open house in 2012. Estimated costs in labor and material is $3541.00 (Doug Rye is contracted through Arkansas Electric to conduct these seminars.)

Website
CECC website, www.craigheadelectric.coop, is promoted using all forms of communications. The website had over 33,437 visits and over 103,182 pageviews for 2012. Approximately 30% of the CECC website was aimed at energy efficiency in 2012. Information available on the website is: EE tips, CFL savings calculator, water heater savings tips, energy savings home tour, construction of model home, heat pump info, and much more. Labor costs totaled around $2546.00 for maintaining the EE portion of the website.

Presentations
Energy Efficient Presentations are made available to civic clubs, organizations and businesses. In 2012 approximately fifty (50) individuals at CRDC (Crowley’s Ridge Development Council) attended an energy efficient presentation on, “Create a More Energy Efficient Life Style”. Total estimated cost of labor and material for presentation was $805.00

Educational Brochures & Materials
Brochures and information on energy efficiency are available to the public in all Craighead Electric offices. Examples of the items are: Air Source Heat Pumps, Geothermal Heat Pump, Mobile Home Efficiency, Energy Efficient Tips, Appliance Usage Sheet, CFL Lighting, 101 Low Cost No Cost Saving Measures, and Home Energy Savings Guide.

This year to assist members in making their homes more energy efficient and to further educate them, each energy audit and seminar participant received a packet of Draft Stoppers. The draft stoppers are installed on their electrical plugs and switches to reduce air infiltration. Also, attached to the packet was a list of energy efficient tips and recommendations.
Programs & Services

Home Visits to Resolve High Bill Complaints/ Energy Audits or Recommendations
No less than 31 visits were made in 2012 to resolve high bill complaints and/or conduct energy audits or give advice for saving energy to members in the field. Total costs of labor and mileage were $5074.00. Recommendations were also made for improvements that would provide an estimated $3890.00 in annual deemed savings, if the recommendations were followed. (see deemed Savings)

Home Infrared Thermography Assessment
Available on every energy audit is an infrared thermograph camera assessment. The infrared camera detects temperature differences. It will show the homeowner where they may have air leaks, and/or insulation deficiencies. This will give the member a visual inspection of their home on where they may have problems with the thermal efficiencies of their home.

Home Heating and Cooling Load Calculations
Six (6) heating and cooling load calculations were performed from the floor plans of members, that were either starting to build or the home was under-construction. This upgraded to version 9 of the RHVAC heating and cooling analysis program at a cost of $384.00. The total cost associated with this was $1666.00.

Commercial Energy Audits
One (1) commercial energy audit was performed this year by CECC personnel with approximately $1050.00 in labor and transportation costs. AECC contributes to the cost of the Energy Auditor.
Load Management Programs

Irrigation Load Control Program
Craighead Electric has 1344 irrigation and 90 fish pond accounts, of which 376 irrigation and 90 fish pond accounts participate in the load control program. Those who participate allow the cooperative to install a switch on their pumps that can be turned off by CECC personnel, when AECC is approaching a monthly demand peak. The savings from this program varies from year to year depending on several factors including weather and farming practices. In 2012 amount credited directly back to the irrigation and fish pond users were $182,011.00. Approximately $57,525.00 was spent on load control equipment and costs related to installation and maintenance. Total saving to the Cooperative with an average load reduction of 14.5 megawatts would be approximately $1,524,240.00

Optional Large Industrial Rate
Large industrial customers have the option of choosing a rate on which they exercise their own load shedding/peak avoiding measures in order to decrease their contribution to the peak. They accomplish this by installing their own generation or by shifting their production to a different schedule, or by a combination of the two. Total savings benefiting the customer amounted to approximately $60,188.00 and CECC had approximately 1364 average KW reduced in demand with a savings of $83,235.00 in 2012 for the cooperative.

Continuing Education for Employees

Employee Continuing Education Programs
Listed below are the courses and conferences that were attended by CECC personnel to continue to learn new and innovative ways to help our member’s make their homes more energy efficient. Total estimated costs associated with the classes were $7390.00

2012 Connect Conference (National) – EE Seminars attended
2012 Electric Cooperatives of Arkansas Spring Conference (State)
2012 Tri-State Electric Cooperatives Conference (Regional)
# Craighead Electric Cooperative

## Deemed Savings Estimates

Based on the Residential Deemed Savings, Installation & Efficiency Standard
By Frontier Associates LLC

### 2012

13 Energy Audits performed

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<tr>
<th>Component</th>
<th>Estimated Kwh Saved</th>
<th>Estimated Kw Demand Saved</th>
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<tbody>
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<td>AC or Heat Pump Tune Up</td>
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<tr>
<td>AC Replacement</td>
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<td>Heat Pump/Electric Furnace Replacement</td>
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<td>Window AC Replacement</td>
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<td>0.095</td>
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<tr>
<td>Ceiling Insulation</td>
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<td>Wall Insulation</td>
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<td>Floor Insulation</td>
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<td>Windows</td>
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<td>Duct Work</td>
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<td>Water Heater Replacement</td>
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<td>Water Heater Pipe Insulation</td>
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<td><strong>Total Possible Savings with Improvements</strong></td>
<td><strong>46,134</strong></td>
<td><strong>9.4545</strong></td>
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Estimated Deemed Savings $3,807.40 $82.82

$0.08253 / kwh (residential rate)
$8.76 per Kw (cost per Kw on power bill)

**Total Possible Deemed Savings** $3,890.22
Craighead Electric Cooperative Corporation  
Energy Efficiency Expenses  
2012

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<th>Related Programs</th>
<th>Category</th>
<th>Labor Costs</th>
<th>Transportation Costs</th>
<th>Material/Other Costs</th>
<th>Member Bill Credit</th>
<th>Total Expenses</th>
<th>Avoided Kw Demand Costs*</th>
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<td>Materials/Brochures</td>
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<td>$ -</td>
<td>$ -</td>
<td></td>
<td>$ -</td>
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<tr>
<td><strong>Programs/Services</strong></td>
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<td>$ 723.00</td>
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<td>$ 239,536.00 $ (1,524,240.00) $ (1,284,704.00)</td>
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<td>$ 11,320.00</td>
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<td>$ 182,011.00</td>
<td>$ 366,761.00 $ (1,667,664.00) $ (1,300,903.00)</td>
<td></td>
</tr>
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</table>

* Based on the average highest peak KW demand for the 4 summer months
** Estimated Savings to the Industrial Account, no billing credit.

These figures do not include benefits from energy efficiency practices that may have been the result of CECC's educational efforts, and of which there is no record of such activity.

The above also does not include the costs of efforts sponsored by AECC, of which Craighead Electric is a participating member. Likewise, the portion of savings benefiting AECC that were not allocated back to CECC in the form of lower wholesale power costs (i.e.: delay or avoidance of generating plant construction), also are not included in this report.
Farmers Electric Cooperative Corporation

Docket No. 08-053-RP
Farmers Electric Cooperative Corporation  
Newport, Arkansas  

2012 Energy Efficiency and Conservation Report  

Farmers Electric Cooperative was incorporated on June 2, 1937 and energized the first lines on August 1, 1938. Since then, Farmers Electric has been dedicated to providing safe, reliable, and affordable electricity to its membership. In 2012, Farmers Electric served 5,103 consumers, with a large percentage from low-income to middle-income families and a large number of agricultural lands.  

Load Control/Demand Response  

Farmers Electric offers two rate options to irrigation customers, a controlled rate and a regular, uncontrolled rate. The difference between these two rate options is significant in both cost and availability of power to the irrigation customer. The regular, uncontrolled rate includes a cost of $0.0788/kilowatt hour for each kWh used, plus $15.45/kW per month demand charge. The controlled rate includes a reduced cost of $0.0684/kilowatt hour for each kWh used, plus a lower demand charge of $9.55/kW per month. When choosing the controlled rate, customers allow the cooperative to install a radio-controlled switch on the pump. The control will interrupt power to the irrigation pump during periods when Farmers Electric total load is contributing to a new statewide peak. The “controlled” periods can vary from a few minutes to several hours. The “controlled” periods can vary from a few days each summer to several consecutive days. Every effort is made to minimize the “controlled” periods and still not contribute to a higher peak demand. In 2012 Farmers Electric has achieved 21.7% reduction in summer peak demand, which has saved our members $671,086/year and postponed the need for 6.4 MW of new coal-fired generation. Farmers Electric had 208 irrigation accounts (approximately 32.5% of all irrigation accounts) connected on the radio-controlled rate.  

Membership Education  

- Each member of Farmers Electric receives a monthly issue of Arkansas Living Magazine, which provides energy savings suggestions as well as energy efficiency tips and various other conservation topics. Each month, the Arkansas Living Magazine designates the center-page to Farmers Electric to use in providing important information to our members such as energy and conservation education.  

- Uses media advertising in local newspaper and radio station, encouraging energy efficiency. More than 1,450 energy efficiency advertisements were run on local radio station, KNBY/KOKR.  

- Farmers Electric employees assist members with high bill complaints. When members have questions regarding the kWh usage on their residences, employees offer examples of ways to help conserve energy – i.e. caulking, insulation, thermostat setting, etc.
• Upon request of member, Farmers Electric will assist with and schedule energy surveys of residences and provide information on energy efficiency that will help with lowering their energy usage.

• Provides educational information at front desk free of charge to the members and others who are interested. Information available at front desk is as follows: Compact Fluorescent Lamps (CFLs), Air Source Heat Pumps, Geothermal Heat Pumps, Energy Efficiency in a Manufactured Home, and Marathon Water Heaters. Staff will consult with members, upon request, to further help with understanding of energy efficiency and conservation measures. Farmers Electric hopes to help our members make wise energy choices.

• Assist members building new construction with energy efficiency building guidelines.

• Assist and educate members and others on the energy efficient water heaters. Staff assists with ordering information, and delivery notification. Marathon Water Heaters are available “at cost” to consumers. Twelve (12) Marathon Water Heaters were sold in 2012, along with one (1) GE Energy Efficient GeoSpring Hybrid Water Heater.

• Display of geo-thermal heat pump with information available in office. Farmers Electric wants to encourage energy efficient forms of residential heating/cooling.

• Provide members and others with CFL bulbs at cost to cooperative. Display in front lobby showcasing the different CFL bulbs and options. Also provides members and others with on-site comparison of CFL bulb and a regular incandescent bulb with a wattage calculating device. To date, Farmers Electric has sold almost 468 CFL bulbs – which contribute to 80% energy savings to those in the community.

• Provide members with energy saving faucet devices, which not only reduces water usage, but also electrical pumping costs. Although not electricity conservation, Farmers Electric wants to provide alternative energy efficiency products to its membership.

• Use energy efficient night lights as a promotional tool. These night lights use only $0.02 worth of electricity per year when left on constantly.

• New bill forms provide customers with kilowatt usage graph to encourage customers to be more aware of usage from month to month.

• Provided calendars for 2013 that offered energy efficiency tips, such as “Replace Air Filters”, “Change 3 Light Bulbs to CFLs” on specific days each month. Also includes other “Smart Energy Tips” as a header for each month. Also provides a website to find further energy efficiency tips, www.SmartEnergyTips.org; as well as other electronic/online media, such as Facebook, Twitter, and YouTube.
First Electric Cooperative Corporation
Jacksonville, Arkansas

2012 Energy Efficiency Report

Introduction

Since its incorporation in 1937, First Electric Cooperative Corporation (FECC) has been dedicated to providing safe, reliable and affordable electricity to its Members. FECC serves more than 88,000 Member accounts throughout parts of 17 counties in central and southeast Arkansas, operating 5 full-service offices in Benton, Heber Springs, Jacksonville, Perryville and Stuttgart.

FECC is an innovative leader in Arkansas, offering a variety of energy efficiency related programs, products and services to its Members. FECC's energy efficiency activities include three major components, which are described in this report.

• Demand Response Programs

• Education

• Products and Services
**Energy Efficiency**

**Demand Response Programs**

- **Load Management**
  - FECC utilizes a load management system to lower its summer peak demand. Load management devices are installed on approximately 6,380 residential electric water heaters and air conditioners, as well as 782 electric irrigation pumps. FECC Members receive a credit on their July through October bills for participating in the program. In 2012, FECC shed approximately 16 megawatts (MW) from its peak demand with water heater, air conditioning and irrigation load management devices. Approximately $846,546 in bill credits was issued to the participating Members. Net avoided kW demand costs were $940,494. See Attachment B for more information.

- **Tariffs**
  - To assist FECC commercial Members, two interruptible credit tariffs are offered. Rate 14 is a Member-managed tariff, and Rate 15 is a FECC--managed tariff. During 2012, 11 commercial Members utilized these rates, allowing FECC to shed an additional 3.8 MW. Approximately $277,423 in bill credits was issued to the participating Members. Net avoided kW demand costs were $122,033. See Attachment B for more information.
Energy Efficiency
Education

- Advertising
  - Newspaper advertising included Marathon water heaters, home improvement loans, and energy audits. Radio advertising included sponsorship of Doug Rye’s “Home Remedies” radio program and energy audits (with print advertising) totaling $5,865.

- Bill Inserts

- Energy Efficiency Mini-Makeover Contest
  - FECC conducted its third annual Energy Efficiency Mini-Makeover contest in 2012, in conjunction with the Energy Efficiency Makeover contest sponsored by the Electric Cooperatives of Arkansas. FECC chose four of its Members to receive mini-makeovers. The purpose of the project was to demonstrate the energy efficiency improvements that can be achieved with a modest investment. The cost of each of the four home improvement projects ranged from $3,000 to $5,000. Each of the winners received a diagnostic energy audit and improvements, which included items such as cellulose insulation in the attic, foam insulation in the crawl space, a vapor barrier, heating and cooling system servicing, duct system repair and sealing, a programmable thermostat, a Marathon electric water heater, CFLs, and caulking and weather-stripping throughout the home. The total project cost was $20,987.

- Model Energy Home
  - In partnership with Doug Rye, Arkansas Electric Cooperative Corporation (AECC) and an area contractor, FECC sponsors the construction of a Model Energy Home. The homes feature modern energy efficient thermal and mechanical components and a guaranteed heating and cooling cost. Open house events are held to educate FECC Members and general public on proper energy efficient building components. FECC did not sponsor a model energy home project in 2012.
Energy Efficiency
Education — continued

• Continuing Education Class at ASU-Heber Springs
  o FECC has partnered with the Continuing Education Department at Arkansas State University-Heber Springs to offer a free course on residential energy efficiency. The course is taught by Anthony Galloway, a marketing representative in the Heber Springs district with more than 24 years of experience. He is certified as a building analyst professional by the Building Performance Institute Inc. and a level one certified building investigations thermographer by the Infrared Training Center. Topics include: implementing no- or low-cost energy conservation measures, making thermal improvements to a home, learning about the cost of air infiltration, choosing the correct heating and cooling system and selecting the most efficient appliances. The course was taught in fall of 2012 with 8 students.

• Level 1 Energy Audits for Key Accounts
  o FECC, in partnership with AECI, conducted 8 Level 1 Energy Audits for key account members to identify energy conservation measures (ECMs) that could be implemented in order to make their operations more energy efficient. The audits were completed by Power of AR and funded through AECI. In several instances the members organized an Energy Efficiency committee with the ECMs outlined and a time table associated with implementing those measures.

• Arkansas Living Magazine
  o Each FECC Member receives a monthly copy of Arkansas Living magazine. The center-page information is specific to FECC Members. During 2012, energy efficiency articles included: prepaid billing, energy efficiency course, Together We Save, energy audits, energy efficiency makeover contest, Energy Star, heat pump loans, heat pump maintenance, energy “vampires”, changing air filters, Marathon water heater online sales and October being energy awareness month. Estimated costs for energy efficiency articles in Arkansas Living totaled $78,000.

• Website
  o FECC’s website, www.firstelectric.coop, is promoted heavily using all means available. As a result, the website had more than 268,206 visits, 127,562 unique visitors and 564,849 page views. The website contains information on all of FECC’s energy efficiency programs, products and services.
  o FECC launched an online shopping cart to making the purchase of water heaters an easier process. The cost of the shopping cart was $10,000. The cart allows both members and non-members to purchase water heaters and determine how to obtain heaters – local pickup or shipment via FedEx.
Energy Efficiency
Products and Services

- Compact Fluorescent Lamps (CFL)
  - FECC promotes the use of and sells CFLs to its Members. In 2012, FECC sold approximately 58 CFLs. In addition, CFLs were donated to FECC Members through energy audits and high bill investigations and to the general public through public relations activities.

- Diagnostic Energy Audits/Energy Audits
  - FECC began offering a residential Diagnostic Energy Audit service in October 2009. This enhanced energy audit utilizes a blower door and infrared camera technologies to identify areas of air leakage and thermal deficiencies. A $100 fee is charged for the service; however, if the Member makes the recommended energy efficiency improvements within six months of the audit, the $100 fee is reimbursed. FECC also promotes and offers residential walk-through energy audits to its Members. The audits are free and provide an overall analysis and recommendation for the Member’s residence. A detailed heating and cooling equipment operating cost analysis can be provided as well. FECC conducted 160 DEA/EA in 2011. See Attachment A for detailed findings.

- Heating and Cooling Load Calculation and Analysis
  - To ensure proper HVAC sizing and operating efficiency, FECC offers residential heating and cooling load calculations and operating cost analysis to its Members. In 2012, 25 load calculations were performed.

- Heat Pump Loans
  - FECC promotes and offers financing for the installation of electric heat pump systems. In 2012, five loans totaling $28,046 were approved. Three loan applications were denied or canceled. As part of the loan qualifying process, FECC conducts an energy audit, heating and cooling load calculation and analysis on the Member’s residence.
Energy Efficiency
Product and Services - continued

• High Bill Investigations
  o FECC offers high bill investigations as a service to its Members. In 2012, 118 high bill investigations were conducted at Member residences or by telephone. In both scenarios, the Member is advised of ways to lower their electric usage using mechanical or thermal improvements and/or a change in energy usage habits. See Attachment A for detailed findings. Using daily automated meter reading reports, FECC proactively contacts those residential Members whose kWh usage is extremely high. This service allows FECC and the Member to quickly identify a faulty or misused appliance.

• Marathon Water Heaters
  o FECC promotes the purchase and use of Marathon electric water heaters. FECC stocks and sells various size units at each of its five district offices. The Marathon has up to a 94% Energy Factor, providing a much lower operating cost than most water heaters on the market. In 2012, FECC sold 268 Marathon water heaters to FECC Members and the general public.
# First Electric Cooperative Corporation
## Jacksonville, Arkansas

### Attachment B
#### 2012 Energy Efficiency Expenses

<table>
<thead>
<tr>
<th>Component</th>
<th>Category</th>
<th>Labor</th>
<th>Material / Other Costs</th>
<th>Member Bill Credits</th>
<th>Total Expenses</th>
<th>Avoided kW Demand Costs*</th>
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<th>Total</th>
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<td>$228,280</td>
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</tr>
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<td>Energy Efficiency Mini-Makeover Contest***</td>
<td>$-</td>
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<td>$-</td>
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<td></td>
<td>Presentations**</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
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<td>$-</td>
<td>$-</td>
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<td>$-</td>
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<td><strong>Products and Services</strong></td>
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<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
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<td>Diagnostic Energy Audits***</td>
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<td>Heating &amp; Cooling Load Calculations**</td>
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<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
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<tr>
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<td>Heat Pump Loans</td>
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<td>High Bill Investigations</td>
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<td>$-</td>
<td>$-</td>
<td>$-</td>
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<td></td>
<td>Marathon Water Heaters</td>
<td>$12,881</td>
<td>$181,661</td>
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<td>$194,543</td>
<td>$-</td>
<td>(196,542)</td>
<td>$(1,999)</td>
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<td>$67,743</td>
<td>$341,914</td>
<td>$1,074,826</td>
<td>$1,484,483</td>
<td>$(2,186,496)</td>
<td>$(187,095)</td>
<td>$(889,108)</td>
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</table>

* Based on the single highest peak kW demand and kW charges only.

** Program costs not specifically tracked, but included in other EE categories.

*** Program labor costs included with Energy Audit labor costs.
2012 Energy Audit and Deemed Savings Report
(For energy audits only)
February, 2013

OVERVIEW

During 2012, First Electric Cooperative performed energy audits and/or high bill complaint analysis on the homes of at least 160 residential members, compared with 263 homes in 2011, 387 in 2010, and 225 homes in 2009. The audit procedure includes an on-site inventory of home and energy use characteristics, investigating high energy usage, analyzing efficiency options, and providing recommendations for efficiency improvements.

AUDIT RECOMMENDATIONS

Recommendations for energy use improvements are divided into eight general categories. In total for 2012, there were 820 specific energy efficiency audit recommendations given to members, broken down as follows (note that most homes have more than one type of recommendation) –

<table>
<thead>
<tr>
<th>Category</th>
<th>Homes</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weatherization</td>
<td>133 homes (83%)</td>
<td></td>
</tr>
<tr>
<td>HVAC</td>
<td>93 homes (58%)</td>
<td></td>
</tr>
<tr>
<td>Insulation</td>
<td>86 homes (54%)</td>
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<tr>
<td>Water heating</td>
<td>75 homes (47%)</td>
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</tr>
<tr>
<td>Lighting</td>
<td>45 homes (28%)</td>
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<tr>
<td>Appliances</td>
<td>35 homes (22%)</td>
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<tr>
<td>Windows/doors</td>
<td>31 homes (19%)</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>24 homes (15%)</td>
<td></td>
</tr>
</tbody>
</table>

DEEMED SAVINGS

Deemed savings analysis is based on data produced by Frontier Associates LLC, showing estimated kW and kWh impacts for specific efficiency improvements. Based on the analysis in the Frontier report, the following shows the estimated impacts of the 2012 efficiency improvement recommendations –

<table>
<thead>
<tr>
<th>category</th>
<th>2012</th>
<th>2011</th>
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<tbody>
<tr>
<td>Total potential kW peak demand reduction to co-op</td>
<td>72.7 kW</td>
<td>50.0 kW</td>
</tr>
<tr>
<td>Total potential annual kWh reduction to members</td>
<td>530,547 kWh</td>
<td>496,699 kWh</td>
</tr>
<tr>
<td>Total potential annual energy cost savings to members (@ $0.08/kWh)</td>
<td>$42,444</td>
<td>$39,736</td>
</tr>
<tr>
<td>Total potential MMBTU reduction</td>
<td>1,810.4</td>
<td>1,694.9</td>
</tr>
</tbody>
</table>

The following shows the estimated reduction in kWh usage and kW peak demand of the audit efficiency improvement recommendations, as well as MMBTU reductions, by category –

<table>
<thead>
<tr>
<th>Category</th>
<th>kWh usage</th>
<th>kW peak</th>
<th>MMBTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation</td>
<td>277,065</td>
<td>33.6</td>
<td>945.4</td>
</tr>
<tr>
<td>Weatherization</td>
<td>123,151</td>
<td>11.5</td>
<td>420.2</td>
</tr>
<tr>
<td>HVAC</td>
<td>98,324</td>
<td>21.6</td>
<td>335.5</td>
</tr>
<tr>
<td>Windows/doors</td>
<td>16,078</td>
<td>3.9</td>
<td>54.9</td>
</tr>
<tr>
<td>Category</td>
<td>Consumption</td>
<td>Cost</td>
<td>Efficiency</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
<td>------</td>
<td>------------</td>
</tr>
<tr>
<td>Water heating</td>
<td>8,244</td>
<td>1.1</td>
<td>28.1</td>
</tr>
<tr>
<td>Appliances</td>
<td>6,200</td>
<td>0.9</td>
<td>21.2</td>
</tr>
<tr>
<td>Lighting</td>
<td>1,485</td>
<td>0.2</td>
<td>5.1</td>
</tr>
</tbody>
</table>

This report was developed by Inside Information® Inc., Smithville, Missouri, as part of a member database project commissioned by First Electric Cooperative, Jacksonville, Arkansas.
### 2012 TOTAL Energy Efficiency Measures

<table>
<thead>
<tr>
<th>Audits reported in 1Q-4Q, 2012 = 160 homes</th>
</tr>
</thead>
</table>

#### I. Lighting

<table>
<thead>
<tr>
<th>Measures recommended</th>
<th>Amount of co-op expenditures invested/yr</th>
<th>Total MMBTU impact from measures recommended or completed</th>
<th>Total potential kWh savings to consumers</th>
<th>Total potential kW peak demand reduction to co-op</th>
<th>Total potential annual kWh savings to consumers (@ $0.08/kWh)</th>
<th>Assumed annual kWh reduction per household</th>
<th>Assumed kW peak demand reduction per household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install compact fluorescent bulbs</td>
<td>45 $</td>
<td>5.07</td>
<td>1,485</td>
<td>0.180</td>
<td>$118.80</td>
<td>33</td>
<td>0.004</td>
</tr>
<tr>
<td>Inspect recessed light fixtures</td>
<td>0 $</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Reduce operation of outdoor lights</td>
<td>0 $</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Use automatic dimmers/lighting controls</td>
<td>0 $</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total – Lighting (25% of homes)</td>
<td>45 $</td>
<td>5.07</td>
<td>1,485</td>
<td>0.180</td>
<td>$118.80</td>
<td>33</td>
<td>0.004</td>
</tr>
</tbody>
</table>

#### II. Appliances

<table>
<thead>
<tr>
<th>Measures recommended</th>
<th>Amount of co-op expenditures invested/yr</th>
<th>Total MMBTU impact from measures recommended or completed</th>
<th>Total potential kWh savings to consumers</th>
<th>Total potential kW peak demand reduction to co-op</th>
<th>Total potential annual kWh savings to consumers (@ $0.08/kWh)</th>
<th>Assumed annual kWh reduction per household</th>
<th>Assumed kW peak demand reduction per household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close refrigerator coils</td>
<td>0 $</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Adjust refrigerator thermostat settings</td>
<td>0 $</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Repair refrigerator/freezer maintenance/seal around door</td>
<td>0 $</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Replace refrigerator/freezer with Energy Star model</td>
<td>7 $</td>
<td>19.75</td>
<td>5,789</td>
<td>0.805</td>
<td>$463.12</td>
<td>827</td>
<td>0.1159</td>
</tr>
<tr>
<td>Repair or replace dryer vent</td>
<td>19 $</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Repair or replace dryer vent</td>
<td>1 $</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Upgrade to more efficient appliances</td>
<td>3 $</td>
<td>1.40</td>
<td>411</td>
<td>0.045</td>
<td>$32.88</td>
<td>137</td>
<td>0.0150</td>
</tr>
<tr>
<td>Install new insulator</td>
<td>0 $</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td>-</td>
<td>76</td>
</tr>
<tr>
<td>Total – Appliances (22% of homes)</td>
<td>38 $</td>
<td>21.16</td>
<td>6,200</td>
<td>0.850</td>
<td>$499.00</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

#### III. Insulation

<table>
<thead>
<tr>
<th>Measures recommended</th>
<th>Amount of co-op expenditures invested/yr</th>
<th>Total MMBTU impact from measures recommended or completed</th>
<th>Total potential kWh savings to consumers</th>
<th>Total potential kW peak demand reduction to co-op</th>
<th>Total potential annual kWh savings to consumers (@ $0.08/kWh)</th>
<th>Assumed annual kWh reduction per household</th>
<th>Assumed kW peak demand reduction per household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add attic insulation</td>
<td>85 $</td>
<td>515.46</td>
<td>151,060</td>
<td>31.590</td>
<td>$12,064.80</td>
<td>2,324</td>
<td>0.469</td>
</tr>
<tr>
<td>Insulate blow cavity walls</td>
<td>21 $</td>
<td>338.59</td>
<td>99,225</td>
<td>0.000</td>
<td>$7,938.00</td>
<td>4,725</td>
<td>0.000</td>
</tr>
<tr>
<td>Install, repair or replace vapor barrier</td>
<td>15 $</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Add or repair wall insulation</td>
<td>10 $</td>
<td>91.38</td>
<td>26,780</td>
<td>1.980</td>
<td>$2,142.40</td>
<td>2,678</td>
<td>0.198</td>
</tr>
<tr>
<td>Insulate attic access door or around attic fan</td>
<td>44 $</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total – Insulation (54% of homes)</td>
<td>156 $</td>
<td>945.43</td>
<td>277,059</td>
<td>33.370</td>
<td>$22,109.20</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

#### IV. Weatherization

<table>
<thead>
<tr>
<th>Measures recommended</th>
<th>Amount of co-op expenditures invested/yr</th>
<th>Total MMBTU impact from measures recommended or completed</th>
<th>Total potential kWh savings to consumers</th>
<th>Total potential kW peak demand reduction to co-op</th>
<th>Total potential annual kWh savings to consumers (@ $0.08/kWh)</th>
<th>Assumed annual kWh reduction per household</th>
<th>Assumed kW peak demand reduction per household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caulk or weatherstrip around doors or windows</td>
<td>105 $</td>
<td>183.09</td>
<td>53,655</td>
<td>4.990</td>
<td>$4,292.40</td>
<td>511</td>
<td>0.04752</td>
</tr>
<tr>
<td>Seal pipes, attic fan, vents, lights, baseboard, etc.</td>
<td>96 $</td>
<td>167.39</td>
<td>49,056</td>
<td>4.562</td>
<td>$3,924.48</td>
<td>511</td>
<td>0.04752</td>
</tr>
<tr>
<td>Repair or install attic air-flow vents</td>
<td>1 $</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Close or repair fireplace dampers/seal flue</td>
<td>22 $</td>
<td>38.36</td>
<td>11,242</td>
<td>1.045</td>
<td>$899.36</td>
<td>511</td>
<td>0.04752</td>
</tr>
<tr>
<td>Repair holes in ceiling or exterior wall</td>
<td>4 $</td>
<td>6.97</td>
<td>2,044</td>
<td>0.190</td>
<td>$163.52</td>
<td>511</td>
<td>0.04752</td>
</tr>
<tr>
<td>Repair leaky bathroom vent/install new exhaust fan</td>
<td>14 $</td>
<td>24.41</td>
<td>7,154</td>
<td>0.665</td>
<td>$572.32</td>
<td>511</td>
<td>0.04752</td>
</tr>
<tr>
<td>Total – Weatherization (83% of homes)</td>
<td>242 $</td>
<td>420.23</td>
<td>123,151</td>
<td>11.452</td>
<td>$9,852.08</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

#### V. Windows and Doors

<table>
<thead>
<tr>
<th>Measures recommended</th>
<th>Amount of co-op expenditures invested/yr</th>
<th>Total MMBTU impact from measures recommended or completed</th>
<th>Total potential kWh savings to consumers</th>
<th>Total potential kW peak demand reduction to co-op</th>
<th>Total potential annual kWh savings to consumers (@ $0.08/kWh)</th>
<th>Assumed annual kWh reduction per household</th>
<th>Assumed kW peak demand reduction per household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install new storm windows or upgrade windows</td>
<td>8 $</td>
<td>54.86</td>
<td>16,078</td>
<td>3.859</td>
<td>$1,286.21</td>
<td>2,010</td>
<td>0.4824</td>
</tr>
<tr>
<td>Install new insulated doors</td>
<td>17 $</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Adjust or repair broken windows or doors</td>
<td>14 $</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total – Windows and Doors (19% of homes)</td>
<td>39 $</td>
<td>54.86</td>
<td>16,078</td>
<td>3.859</td>
<td>$1,286.21</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>VI. HVAC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>-----</td>
<td>----</td>
<td>-----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td></td>
</tr>
<tr>
<td>1. Change furnace and A/C filter</td>
<td>7</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td></td>
</tr>
<tr>
<td>2. Repair, seal and close gaps in ductwork/return air</td>
<td>62</td>
<td>$-</td>
<td>64.32</td>
<td>18,848</td>
<td>2,313</td>
<td>$1,507.84</td>
<td>304</td>
</tr>
<tr>
<td>3. Repair or service central air or heat pump</td>
<td>9</td>
<td>$-</td>
<td>13.33</td>
<td>3,906</td>
<td>1,890</td>
<td>$312.48</td>
<td>434</td>
</tr>
<tr>
<td>4. Replace central air unit</td>
<td>6</td>
<td>$-</td>
<td>20.23</td>
<td>5,928</td>
<td>2,460</td>
<td>$474.24</td>
<td>988</td>
</tr>
<tr>
<td>5. Replace or install new air-source heat pump</td>
<td>33</td>
<td>$-</td>
<td>237.26</td>
<td>69,531</td>
<td>14,850</td>
<td>$5,562.48</td>
<td>2,107</td>
</tr>
<tr>
<td>6. Replace window A/C with high-efficiency window units</td>
<td>1</td>
<td>$-</td>
<td>0.38</td>
<td>111</td>
<td>0.095</td>
<td>$8.88</td>
<td>111</td>
</tr>
<tr>
<td>7. Install geothermal heat pump</td>
<td>0</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td></td>
</tr>
<tr>
<td>8. Install or use ceiling fans</td>
<td>1</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td></td>
</tr>
<tr>
<td>9. Install wall tree</td>
<td>10</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td></td>
</tr>
<tr>
<td>10. Install programmable thermostat</td>
<td>9</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td></td>
</tr>
<tr>
<td>11. Adjust thermostat settings (lower winter, higher summer)</td>
<td>4</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td></td>
</tr>
<tr>
<td>12. Remove obstructions to inside HVAC units</td>
<td>2</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td></td>
</tr>
<tr>
<td>13. Remove obstructions to outside HP or CA unit airflow</td>
<td>1</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td></td>
</tr>
<tr>
<td>14. Repair/adjust backup heat strips/portable electric heaters</td>
<td>5</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td></td>
</tr>
<tr>
<td>15. Install drapes or window shades</td>
<td>0</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
<td></td>
</tr>
</tbody>
</table>

Total — HVAC (58% of homes) 141 $- 335.51 98,324 21,608 $7,865.92

<table>
<thead>
<tr>
<th>VII. Water Heating</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Turn down/tighten timer for water heater thermostat</td>
<td>10</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
</tr>
<tr>
<td>2. Install water heater insulation wrap/blanket</td>
<td>61</td>
<td>$-</td>
<td>15.92</td>
<td>4,636</td>
<td>0.366</td>
<td>$370.88</td>
</tr>
<tr>
<td>3. Repair leaks in water heater tank or pipes</td>
<td>6</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
</tr>
<tr>
<td>4. Install more efficient water heater</td>
<td>9</td>
<td>$-</td>
<td>5.41</td>
<td>1,584</td>
<td>0.126</td>
<td>$126.72</td>
</tr>
<tr>
<td>5. Service/repair/replace water heater element</td>
<td>0</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
</tr>
<tr>
<td>6. Install hot water pipe insulation/install heat trap</td>
<td>46</td>
<td>$-</td>
<td>6.91</td>
<td>2,024</td>
<td>0.644</td>
<td>$161.92</td>
</tr>
<tr>
<td>7. Install faucet aerators</td>
<td>0</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
</tr>
<tr>
<td>8. Install low-flow showerheads</td>
<td>0</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
</tr>
<tr>
<td>9. Use cold water for washing clothes</td>
<td>0</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
</tr>
</tbody>
</table>

Total — Water Heating (41% of homes) 126 $- 28.13 6,244 1,136 $659.52

<table>
<thead>
<tr>
<th>VIII. Miscellaneous</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Begin leveling billing</td>
<td>0</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
</tr>
<tr>
<td>2. Reduce use/add timers on pool/hot tub/garden pumps</td>
<td>23</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
</tr>
<tr>
<td>3. General conservation, unplugged appliances when not in use</td>
<td>0</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
</tr>
<tr>
<td>4. Explain fuel cost adjustment</td>
<td>0</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
</tr>
<tr>
<td>5. Repair, replace, or cycle dehumidifier</td>
<td>2</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
</tr>
<tr>
<td>6. Test or check meter/breaker/wiring/gas leaks</td>
<td>1</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
</tr>
<tr>
<td>7. Test or check well water pump</td>
<td>0</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
</tr>
<tr>
<td>8. Explain weather/usage recommend full audit, blower door</td>
<td>1</td>
<td>$-</td>
<td>0.00</td>
<td>0</td>
<td>0.000</td>
<td>$-</td>
</tr>
</tbody>
</table>

Total — Miscellaneous (15% of homes) 27 $- 0.00 0 0.000 $- 

GRAND TOTAL 820 $- 1,810.38 530,547 72.7 $42,446
First Electric -- 1Q-4Q 2012 energy audits and high bill complaints

<table>
<thead>
<tr>
<th>Heating type</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat pump</td>
<td>63%</td>
<td>71</td>
</tr>
<tr>
<td>Electric furnace or electric resistance</td>
<td>12%</td>
<td>13</td>
</tr>
<tr>
<td>Gas furnace</td>
<td>25%</td>
<td>26</td>
</tr>
<tr>
<td>Wood stove</td>
<td>0%</td>
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<tr>
<td>Baseboard/ceiling/portable electric</td>
<td>1%</td>
<td>1</td>
</tr>
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<tr>
<td>Heat pump</td>
<td>63%</td>
<td>70</td>
</tr>
<tr>
<td>Central air</td>
<td>32%</td>
<td>36</td>
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<tr>
<td>Window unit</td>
<td>5%</td>
<td>5</td>
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<tr>
<td>Less than 3 tons</td>
<td>10%</td>
<td>10</td>
</tr>
<tr>
<td>3-3.5 tons</td>
<td>35%</td>
<td>35</td>
</tr>
<tr>
<td>4-5 tons</td>
<td>36%</td>
<td>38</td>
</tr>
<tr>
<td>&gt;5 tons</td>
<td>16%</td>
<td>16</td>
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</tr>
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<table>
<thead>
<tr>
<th>Water heater type</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Electric</td>
<td>78%</td>
<td>77</td>
</tr>
<tr>
<td>Gas</td>
<td>22%</td>
<td>22</td>
</tr>
<tr>
<td>Tankless</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
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<table>
<thead>
<tr>
<th>Water heater size</th>
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</thead>
<tbody>
<tr>
<td>Less than 40 gallons</td>
<td>5%</td>
<td>5</td>
</tr>
<tr>
<td>40 gallons</td>
<td>42%</td>
<td>40</td>
</tr>
<tr>
<td>50-75 gallons</td>
<td>30%</td>
<td>29</td>
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<tr>
<td>80 or more gallons</td>
<td>23%</td>
<td>22</td>
</tr>
<tr>
<td>Unknown -- not listed</td>
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<td>61</td>
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</table>
Deemed Savings Analysis
2012 TOTAL – Deemed Savings Analysis

Number of Efficiency Measures Recommended

Total = 4,908 measures
Potential kW Peak Demand Reduction to Co-op from EE Measures

2012 TOTAL - Deemed Savings Analysis

Total = 412 kW
2012 TOTAL – Deemed Savings Analysis

Potential Annual Reduction in kWh Energy Use from EE Measures

Total = 3,052,843 kWh
2012 TOTAL – Deemed Savings Analysis

Potential Annual MMBTU Reduction from EE Measures

Total = 10,417 MMBTU
2012 TOTAL - Deemed Savings Analysis

Potential Annual Cost Savings to Members from EE Measures

Based on kWh reduction at average $0.08/kWh
Total = $244,228

2007
2008
2009
2010
2011
2012

$0
$20,000
$40,000
$60,000
$80,000
$100,000

$9,875
$43,223
$46,725
$62,225
$42,444

$100,000
$80,000
$60,000
$40,000
$20,000
$0
Energy Audit Characteristics
2012 TOTAL -
Energy Audit Tracking

Number of Homes with Energy Audits and High Bill Complaints

Total = 1,437 homes over six years

- 2007: 387
- 2008: 328
- 2009: 263
- 2010: 225
- 2011: 160
- 2012: 74

Total 1,437 homes over six years
2012 TOTAL – Energy Audit Tracking

Types of Recommendations (% of homes)

Most of the home recommendations in 2012 involved weatherization, HVAC or insulation
2012 TOTAL – Energy Audit Tracking

Trends in Types of Recommendations (% of homes)

Most recommendations over the past few years have involved weatherization, HVAC and insulation.
### Specific Energy Audit Recommendations

- **Caulk, seal around doors, windows:** 105
- **Seal around pipes/electrical/attic fans:** 96
- **Add attic insulation:** 65
- **Repair or seal ductwork:** 62
- **Install water heater insulation:** 61
- **Insulate water heater pipes:** 46
- **Install CFLs:** 45
- **Insulate attic fan or access door:** 44
- **Install high-efficiency heat pump:** 33
- **Close or seal fireplace/damper:** 22
- **Add insulation for floor, crawl space:** 21
- **Repair/replace dryer vent:** 19

**Most 2012 recommendations involved caulking and sealing**
HVAC and Water Heating Characteristics
2012 TOTAL – Energy Audit Tracking

Primary Home Heating Type

- Heat pump: 63%
- Gas furnace: 25%
- Elec furnace, resistance: 12%
- Portable elec or baseboard: 1%
- Wood stove: 0%

Most 2012 audited households have electric heating
2012 TOTAL –
Energy Audit Tracking

Type of Air Conditioning

- Heat pump: 63%
- Central: 32%
- Window: 5%

Size of A/C Unit

- < 3 tons: 10%
- 3-3.5 tons: 35%
- 4-5 tons: 38%
- > 5 tons: 16%

First Electric Cooperative

2012 TOTAL – Energy Audit Tracking

Type of Water Heater

- Electric: 78%
- Tankless: 0%
- Gas: 22%

Size of Water Heater

- < 40 gal: 5%
- 40 gallons: 42%
- 50-75: 30%
- 80+ gal: 23%

South Central Arkansas Electric Cooperative, Incorporated

Docket No. 08-055-RP
South Central Arkansas Electric Cooperative, Inc.

1140 Main Street
P.O. Box 476
Arkadelphia, Arkansas 71923-0476
Telephone: (870) 246-6701
FAX: (870) 246-8223

February 25, 2013

South Central Arkansas Electric Cooperative, Inc. (SCAEC) was incorporated on July 31, 1940. Our first lines were energized on April 22, 1942. We presently maintain 1,863 miles of line. We serve 7,666 members and 9959 accounts. SCAEC has an account base of 95% residential and 5% commercial & industrial accounts.

Arkansas Electric Cooperative provides resources and information to members on behalf of SCAEC, as well as the general public, on a continuous basis. AECC expenditures for 2012 amount to $196,787.00.

SCAEC implemented a Pre-Pay electric service program in late 2011. We have actively educated our members during 2012, increasing participation to 112 members. The Pre-Pay electric program promotes energy conservation by allowing the consumer to be involved in daily usage and monitoring. Studies show that consumers using the Pre-Pay electric program have reduced consumption up to 12% monthly.

SCAEC implemented “Beat the Peak” in May, 2012. The program proactively educated members about high-priced wholesale power costs during the peak season. Bill inserts, as well as website information, were mailed to members during the cooperative peak billing season. Members were asked to conserve energy between the hours of 3 p.m. and 7:00 p.m. SCAEC's membership response was phenomenal, reducing wholesale power costs by an estimated $130,060.

Industrial loads participate in load shedding during our peak billing season. During these months, members are educated on their contribution to SCAEC wholesale power costs. SCAEC personnel notify these key accounts approximately 3-5 hours prior to obtaining system peak. Members work with SCAEC to reduce load and/or unnecessary equipment during those crucial hours. Member savings are substantial during peak hours as they are not required to pay for excessive usage during off-peak billings.

Arkansas Living magazine is distributed to each cooperative member on a monthly basis. The magazine offers energy efficient ideas, tips and suggestions.

SCAEC’s website provides numerous suggestions about energy efficiency and conservation. The website also offers outside links for members to use for additional information.

SCAEC personnel are members of local civic and community organizations. We provide public presentations to organizations requesting information on efficiency and conservation.

Energy audits are offered free to our members. Members are encouraged to request audits for their residence if they have exceptional usage. We also have member support representatives available to answer questions regarding efficiency and conservation. SCAEC will perform blower door tests for members if requested.
Summary of monies spent by SCAEC for energy efficiency:

Arkansas Living magazine $33,088.00
Thermal imaging camera $3,285.00
Employee Costs/Training $4,500.00
Beat the Peak Program $10,344.00

Estimated savings to our members:

PrePaid metering $16,020.00
Energy audit recommendations $2,500.00
Load-shedding program $86,706.00
Beat the Peak program $130,060.00

Sincerely,

TJ Curtis
Member Services Representative
South Central Arkansas Electric Cooperative, Inc.
1140 Main Street
Arkadelphia AR 71923
Woodruff Electric Cooperative Corporation

2012 Energy Efficiency and Conservation Efforts

Please refer to Woodruff Electric’s report on energy efficiency efforts submitted for the year 2007 for the cooperative’s philosophy on the efficient use of energy. Continuing programs are described below including program costs and benefits.

Energy Efficiency Programs

Timely Topics Newsletter
The newsletter, Timely Topics, is published and mailed with each bill monthly. Although the newsletter addresses various topics related to the cooperative, approximately 27% of the space was directed at energy efficiency in 2012. This 27% is equivalent to $3,144 in publishing costs alone for 2012, and does not include employee labor, overhead and expenses involved in the production.

Rural Arkansas Magazine
The Rural Arkansas magazine is sent to each cooperative member each month. Likewise, approximately 8% of the available space for 2012 was dedicated to energy efficiency education. Woodruff Electric’s cost for this 8% was $3,532.

Radio and Television Ads
Woodruff Electric pays directly for radio and TV ads to relay a variety of messages related to the co-op. In 2012, approximately 65% of those ads were directed toward energy efficiency education for a total of $5,058.

Newspaper Ads
Approximately 10% of newspaper ad space bought by WECC in 2012 was directed toward energy efficiency education and amounted to $495.

Website
Approximately 40% of the WECC website was aimed at energy efficiency in 2012 for a total of $3,600.

Marathon Water Heater Sales and Lease Program
In January 2004, Woodruff Electric began a program to sell and lease Marathon water heaters. The cooperative embarked on this program because of the belief that Marathon was the most efficient, best made water heater on the market, and because of these facts, it is also very expensive. The expense certainly has something to do with the fact that there are few retail outlets that stock the Marathon. WECC wanted to provide a service by making the water heaters available for sale, while making them affordable to the average consumer. The sales and lease options have accomplished these goals. In 2012, 37 Marathons were leased to cooperative members and 23 were sold to members.
and non-members. The GE heat pump water heater was also promoted and made available for sale.

**Civic Programs**

Programs are made available to civic and other organizations pertaining to energy efficiency. The Forrest City radio station, KXJK, has a talk show each morning, and a WECC representative is the guest on that program once or twice per year. Energy efficiency is usually the primary topic. A program was presented to Forrest City Lion’s Club on energy efficiency.

A program on energy efficiency was presented to approximately 20 low income clients of Crowley’s Ridge Development Council.

**Chevy Volt**

In late 2011, Woodruff Electric leased a Chevrolet Volt extended range electric vehicle to become familiar with the practicality and cost of operation of electric vehicles. The cost of all fuel that is supplied to the car, including electricity and gasoline, is recorded for evaluation. The performance and practicality of the car is presented to the public at civic club meetings, co-op publications and media outlets.

**Home Visits to Resolve High Bill Complaints/ Energy Audits or Recommendations Made during Phone Conversations**

No less than 10 visits were made in 2012 to resolve high bill complaints and/or conduct energy audits or give advice for saving energy. The numbers of high bill complaints and energy audits were lower in 2012 because of the mild winter weather. Costs associated with these were $1,461 in time, labor and transportation. Malfunctioning equipment and/or appliances found during visits would amount to an annualized cost, if not corrected, of $5,900. Recommendations were also made for energy efficiency improvements that would provide an estimated $1,400 in annual savings if the recommendations were followed.

**Home Energy Efficiency Makeover House**

For the past several years the Electric Cooperatives of Arkansas have sponsored a contest that demonstrates how energy improvements can be made to an existing house to improve the comfort and utility bills of the house. In 2012 a Woodruff Electric member was selected as the winner. The house was eligible for up to $50,000 in improvements, which in this case included a geothermal heat pump, foam insulation in attic and walls, new windows, new appliances, a GE heat pump water heater and weather sealing.

**Irrigation Load Control Program**

Woodruff Electric has approximately 5,500 irrigation accounts, of which approximately 4,675 participate in the load control program. Those who participate allow the cooperative to install a switch on their irrigation pumps that can be controlled by WECC personnel when AECC is approaching a monthly demand peak. The savings from this program varies from year to year depending on several factors including weather and farming practices, but in 2012 the estimated savings to Woodruff Electric and its members, including approximately $2.18 million credited directly back to the
irrigators, totaled $6,425,403. Approximately 650 residential air conditioner controls are in place that are responsible for avoiding approximately 500 kw of demand. These savings are included in the irrigation total.

Optional Large Industrial Rate

Large industrial customers have the option of choosing a rate on which they exercise their own load shedding/peak avoiding measures in order to decrease their contribution to the peak. They accomplish this by installing their own generation or by shifting their production to a summer schedule, or by a combination of the two. Total savings directly benefiting the customers amounted to approximately $952,965 in 2012.

Imbedded Costs Spent on Energy Efficiency and Peak Avoidance

The above paragraphs have not addressed employee labor, transportation, equipment or overhead costs. Approximately $214,103 was spent on customer assistance expenses directed at helping customers reduce their electric usage. Approximately $128,551 was spent on load control equipment and costs related to installation. Costs for these categories totaled $342,654 for 2012.

Summary

Approximate costs spent by Woodruff Electric for energy efficiency and load shifting efforts as listed in this report total $359,944.

Approximate savings directly or indirectly benefitting the membership, as totaled in this report equal $7,385,668. This number does not include benefits from energy efficiency practices that may have been the result of WECC’s educational efforts, and of which there is no communication with Woodruff Electric of such recommendations being accomplished.

The above also does not include the costs of efforts sponsored by AECC, of which Woodruff Electric is a participating member. Likewise, the portion of savings benefiting AECC that indirectly benefited Woodruff Electric in the form of lower wholesale power costs (i.e.: delay or avoidance of generating plant construction), also are not included in this report.

Through the load shedding programs of irrigation and large industrial customers, Woodruff Electric reduced its peak coincident demand by approximately 66.4 megawatts.
Ouachita Electric Cooperative Corporation

Docket No. 08-062-RP
2012 Energy Efficiency and Conservation Report

Incorporated in 1938, Ouachita Electric has been dedicated to providing safe, reliable, and affordable electricity to its membership. In 2012, Ouachita Electric had 1,876 miles of line, and served an average of 9,457 meters. Large power members include several defense manufacturers, consumer products manufacturers, timber products companies, police academy, fire training academy and a two-year college.


Time of Use Rate
As an incentive to promote a more balanced use of total system generation resources, Ouachita Electric offers an optional time of use rate to large power customers. Under this rate, Non-coincident Peak kW is billed at 45% of the rate for Coincident Peak kW. The rate is available to customers requiring three-phase power in excess of 250 kW of demand.

Prepaid Metering
Ouachita Electric makes service available to residential customers on a prepaid basis. This program features an in home display unit that provides customers with daily and monthly usage data. Such a device gives customers the means to monitor and adjust power consumption continually. Research indicates that consumers on similar programs decrease kWh consumption an average of about 7%.

OECC ended 2012 with 173 prepaid accounts (up from the previous year’s 121 accounts). Based on total usage for these customers: 1,375,192 kWh’s, an approximate 96,263 kWh’s were saved in the amount of $10,430.00.

Membership Education
• Each member of Ouachita Electric receives a monthly issue of Rural Arkansas Magazine, which provides energy savings suggestions as well as energy efficiency tips and various other conservation topics. Each month Rural Arkansas
Magazine designates the center page to Ouachita Electric to use in providing important information to our members such as energy and conservation education. An estimated 35% of the magazine focused on energy efficiency and conservation. Total cost of magazine to Ouachita Electric: $27,958.93 x 35% = $9,785.63.

- Ouachita Electric sponsors the Doug Rye nationally syndicated radio program, "Home Remedies" on local radio station that can be heard throughout our service area. Doug Rye's radio program teaches listeners how to save money by making their homes more energy efficient. Cost of program for 2012: $3,180.00. Additionally, $7,644.44 was spent for newspaper ads and other radio ads. Approximately 20% of these ads were geared toward energy efficiency ($1,528.89), for a total of $4,708.89.

- At the request of a member, Ouachita Electric will perform an energy survey of the member’s residence or business to identify opportunities for improving energy efficiency at that location. The member is then advised about specific steps that can be taken to achieve these efficiencies. During the reporting period, January – December 2012, experienced Cooperative personnel performed 5 energy audits/blower door tests at no cost to the consumer. Follow ups are performed to verify what recommendations are being employed at those locations. Audit and other administrative costs total $4,161.09.

- Qualified member services representatives provide energy saving tips in response to member inquiries and high bill complaints. Member services representative consult with members to broaden his or her understanding of energy efficiency and conservation measures. MSR’s logged time counseling time spent for a dollar amount of $1,484.47.

- In cooperation with Arkansas Electric and Building Design Services, commercial audits are performed. Audit at local school service cooperative revealed an estimated savings of $3,700.00 if all recommendations were completed.

- Along with the Electric Cooperatives of Arkansas Energy Efficiency Home Makeover Contest, OECC awarded to and installed for one member a GE Hybrid Water Heater. Total cost of heater, plumbing and carpentry necessary for installation:

- In 2012, Ouachita Electric spent $1,606.19 for employee training in energy efficiency to better assist in educating its members. Trainings included the FLIR Residential Energy Audit Thermographer Certification Class and CSR training in high bill complaints.
• OECC provides educational information both in either printed or electronic form. Approximately 25% of the website www.oecc.com has sections devoted to energy efficiency tools. Examples of these are the Apogee Home Energy Suite Pages, consisting of the Home Energy Calculator, the Interactive Energy Home, Geothermal Heat Pump Systems, Lighting Calculator, Heat Pump Calculator, Appliance Calculator and the Kids Korner. The site also provides a link to the U.S. Department of Energy website.

Inside-Information (maintaining website, customer surveys, etc.)
$13,950.00 x 25% = $3,487.50

• Through the Doug Rye Model Home Program, Ouachita Electric assists members in constructing new homes following energy efficiency building guidelines.

• Programs are made available to civic organizations relating to energy efficiency. Scott Davis, Magician, performs at local elementary schools and civic organizations. Much of his program is devoted to educating the public about energy efficiency, and advising them on ways to conserve energy. Doug Rye seminars are also held annually.

• Members are educated on the efficiency of Marathon and GE Hybrid Water Heaters.

• Ouachita Electric has conducted “Town Hall” meetings in each board district to emphasize the need for members to take stringent energy efficiency measures in the face of rising fuel costs and increased load demands.

Summary of monies spent by Ouachita Electric Cooperative to educate our membership and promote energy efficiency:

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<tr>
<th>Description</th>
<th>Amount</th>
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</thead>
<tbody>
<tr>
<td>Rural Arkansas</td>
<td>$9,785.63</td>
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<tr>
<td>Radio and Newspaper Ads</td>
<td>1,528.89</td>
</tr>
<tr>
<td>Doug Rye Home Remedies</td>
<td>3,180.00</td>
</tr>
<tr>
<td>Customer Contact (including Energy Audits/Home Visits/Consultations)</td>
<td>5,645.56</td>
</tr>
<tr>
<td>Employee Training</td>
<td>1,606.19</td>
</tr>
<tr>
<td>OECC website</td>
<td>3,487.50</td>
</tr>
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<td><strong>Total</strong></td>
<td><strong>$25,233.77</strong></td>
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Summary of estimated savings to members:

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<th>Description</th>
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<tr>
<td>Estimated Savings from Prepaid Metering</td>
<td>$10,430.00</td>
</tr>
<tr>
<td>Estimated Savings from Audit Recommendations</td>
<td>3,700.00</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$14,130.00</strong></td>
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Energy Efficiency and Conservation APSC Reporting

Ouachita Electric will report at regular specified intervals to the APSC on programs designed to provide its members with information about energy efficiency and conservation, and its practices to promote energy efficiency and conservation throughout its service territory.
Ashley-Chicot Electric Cooperative, Incorporated

Docket No. 08-063-RP
2012 Energy Efficiency and Conservation Report

Ashley-Chicot Electric Cooperative Inc.
Hamburg, Arkansas

Ashley-Chicot Electric Cooperative was incorporated in February 1941 and energized the first lines in 1944. Since then, Ashley-Chicot Electric has been dedicated to providing safe, reliable, and affordable electricity to its membership. In 2012, Ashley-Chicot Electric served an average of 5,104 consumers, a large percentage from low-income families and a depressed agricultural area.

Ashley-Chicot Electric has engaged in the following activities: The Arkansas Energy Efficiency Education Program, Arkansas Weatherization Program, Deemed Savings Survey, and Energy Efficiency and Conservation APSC Reporting, at a state wide level, while engaging in load control and membership education within our service area.

Load Control

Ashley-Chicot Electric offers two rate options to irrigation customers, a controlled rate and an uncontrolled rate. The differences between these two rate options are significant in both cost and availability of power to the irrigation customer. The standard uncontrolled rate includes a cost per kilowatt-hour for each kWh used plus $9.15 per horsepower per month. Irrigation customers can avoid the $9.15 per horsepower charge by permitting the cooperative to install a radio-controlled switch on the pump. The control will interrupt power to the irrigation pump during periods when Ashley-Chicot Electric’s total load is contributing to a new statewide peak. The “controlled” periods can vary from two to six hours. The “control” periods can vary from a few days each summer to several consecutive days. Every effort is made to minimize the control periods and still not contribute to a higher peak demand. Historically, Ashley-Chicot Electric has achieved a 10% - 15% reduction in summer peak demand, which saves our members approximately $150,000 - $200,000 per year and postpones the need for 2-3 MW of new coal fired generation.
Membership Education

- Each member of Ashley - Chicot Electric receives a monthly issue of Arkansas Living Magazine, which provides energy savings suggestions as well as energy efficiency tips and various other conservation topics. Each month Arkansas Living Magazine designates the center page to Ashley - Chicot Electric to use for providing important information to our members such as energy and conservation education as well as safety. (The magazine is also being utilized as a resource in the Hamburg School System by a Jr. High History Class.)

- Ashley - Chicot Electric sponsored the Doug Rye nationally syndicated radio program, “Home Remedies” on local radio stations that can be heard throughout our service area. Doug Rye’s radio program teaches listeners how to save on electric bills by making their homes more energy efficient and also creates awareness of the need and opportunities available for energy efficiency.

- Upon request of member, Ashley - Chicot Electric will assist with an energy survey of a residence and provide information on energy efficiency that will help with lowering their energy usage.

- The cooperative provides educational information at front desk free of charge to the members or to anyone who is interested. Member services representative will consult with members, upon request, to further help with understanding of energy efficiency and conservation measures. A representative follows up by phone to check on results of consultation and see if further assistance is needed. Through energy efficiency education we will help our members make wise energy choices.

- Assist members building a new construction with energy efficiency building guidelines. A copy of Building Guidelines for Energy Efficiency is available at our office free of charge.

- We strive to educate members on the efficiency benefits of the Marathon Water Heater and the GE Hybrid Water Heater. We also assist with information on
purchasing and help with delivery of water heater to our warehouse for pickup by member.

➢ Our new website was launched in 2012 and contains a complete section devoted to energy efficiency techniques and information plus a complete section devoted to safety.

**Energy Efficiency and Conservation APSC Reporting**

Ashley - Chicot Electric will be reporting to the APSC the practices in providing its members with energy and conservation information.

**What’s to come in 2013**

Ashley - Chicot Electric will continue to provide information for members via these same avenues in 2013 and will be looking for newer methods of educating our membership with regards to energy efficiency. We are constantly looking for unique, innovative products on the market that will help the public become more efficient and wiser electricity users and communicating these on the website. Ashley-Chicot will be participating in a program to install LED security lighting in place of the old mercury vapor and metal halide lights that most utilities use to provide yard lighting for customers’ homes. The new lighting will cut usage of electricity by yard lighting approximately 50%.

**Conclusion**

Ashley-Chicot Electric Cooperative continues to be committed to providing our members with safe, reliable, efficient and affordable electric power. We are a leader in demand response, energy efficiency, and the promotion of safety as well as being committed to keeping rates as low as possible without compromising quality and service.