

What we do

Associated Electric Cooperative Inc.

A Touchstone Energy® Cooperative 



Power supply facts

Generating Clean, Affordable, Reliable Electricity for members is what we're about at Associated Electric Cooperative. Associated is owned by and provides wholesale power to six regional and 51 local electric cooperative systems in Missouri, southeast Iowa and northeast Oklahoma that serve about 875,000 members.

AECI's mission:

Associated's mission is to provide an economical and reliable power supply and support services to its members.

AECI's vision:

Associated Electric Cooperative will be the lowest-cost wholesale power supplier.

AECI's core values:

Safety – We work as a team and look out for each other. We continually strive to improve safety performance and take immediate action when a safety issue is identified.

Integrity – We act with honesty, respect, accountability and commitment in all functions and interactions. This strengthens our relationships within Associated and our three-tiered system, as well as with our strategic business partners.

Member focused – We never forget for whom we work and why we exist. We are committed to supplying reliable electricity and being the low-cost provider for our member-owners.

Employee value – We have confidence in ourselves and the organization and we trust and respect each other. We leverage the talents and contributions of every individual, and encourage individual responsibility and quick action.

Performance excellence – We value, recognize and reward high performance. Through innovation, teamwork and continuous improvement we achieve efficiencies and meet our members' expectations.

Community citizenship – We partner with our local communities to improve the quality of life. This begins with providing economical and reliable power and continues as we represent Associated in the community.

Business strategy

Focus on core business

Commitment to financial strength and flexibility

Proactive and conservative management of risk

Development and management of strategic alliances

Informed and involved member-owners

AECI facts:

About 650 full-time employees work at three main locations: Headquarters, New Madrid Power Plant and Thomas Hill Energy Center.

Total generating capacity: 5,700 MW (including contracted coal, wind and hydropower sources)

Miles of high-voltage transmission lines owned by AECI and its six owner G&Ts: more than 9,900

7-25-2016

Members score 83 on system among best utilities

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Collective responses from a member survey gave the three-tiered system served by Associated Electric Cooperative among the highest American Customer Satisfaction Index score among energy providers in the U.S. and higher than the national benchmark for the industry. The ACSI, by the way, is considered the gold standard of consumer satisfaction measurement.

The high score indicates members are generally well satisfied with the services of their local cooperatives. In fact, the longer a member is with the co-op, the higher the satisfaction score.

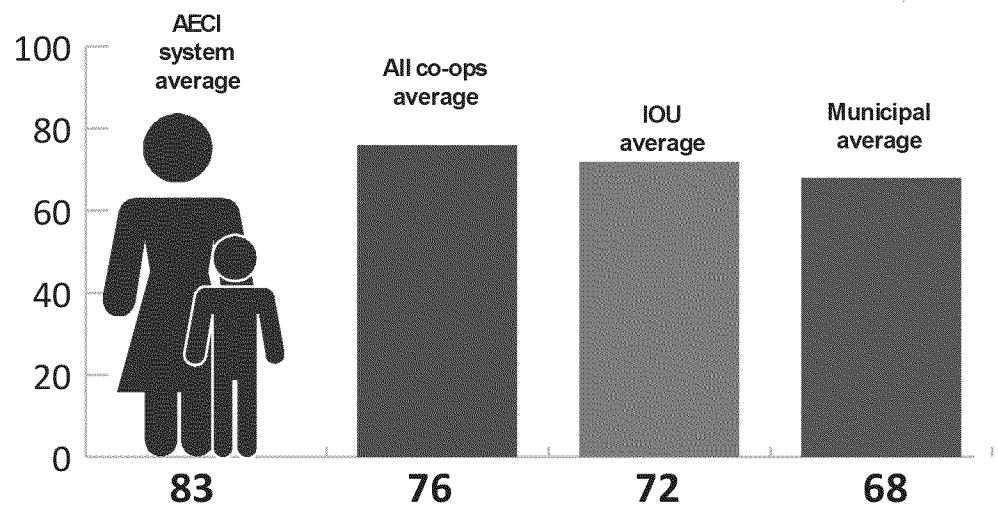
That's good news for member cooperatives, which use the survey as a tool to ensure they are meeting the needs of their members.

The telephone survey collected demographic data, customer satisfaction levels and opinions about energy issues from members of 49 cooperatives in Iowa, Missouri and Oklahoma.

The survey of 12,284 members showed they want clean, affordable, reliable electricity, and they are highly satisfied with their cooperatives.

Member co-ops outrank other utilities

Source: ACSI, June 2016



At the end of the line, members need affordable electricity

Older, middle-income households living in older homes and paying modest monthly electric bills represent the core population of electric cooperatives. These survey results show Associated Electric Cooperative's mission to provide an economical, reliable power supply and support services to its members remains important.

- 41 percent of member households have income of less than \$50,000 a year.
- 16 percent have income of less than \$25,000 a year.
- High-income households (more than \$150,000) are 6 percent of households.
- Nearly two-thirds of surveyed members indicated they are age 55 or older.
 - 39 percent of members are age 65 or older, and many of those are on limited or fixed incomes.
 - 51 percent of senior-member households make less than \$50,000 a year.
 - 22 percent of members age 65 and older reported income of less than \$25,000.
- The highest wage earners are found in households age 35 to 54.
- The youngest age group, ages 18 to 34, is 6 percent of membership. In this age group, 4 out of 10 earned less than \$50,000.
- Two-thirds of AECI system households include only one or two individuals. Conversely, one-third of households hold three or more members.
- 44 percent of surveyed members are employed; 40 percent is retired or on a pension; and 3 percent is unemployed.

Age, tenure and income affect member satisfaction

Member satisfaction varies significantly with the age of respondent and length of their co-op membership. Older members who have been with the cooperative a while provide the highest satisfaction ratings. The highest ratings come from senior members with lower incomes.

- More than half said they've been members of their electric cooperative more than 20 years (longer than the national benchmark).
- Members 65 years and older exceed younger members' satisfaction scores by as many as nine points.
- Members are more satisfied when they identify as members, and not just as utility customers. That's one reason why members are encouraged to find

out the difference at www.MembersFirst.coop.

- Member identity is highest among senior members and lowest among those under age 45.
- More than half of respondents had some degree of member identity, a slight improvement over the 2013 survey.
- Younger members with higher incomes consistently provide lower satisfaction ratings than lower-income senior members.
- Satisfaction scores dip for middle-aged households (age 35-44), who are likely strained by growing family and financial demands. Larger households tend to have lower satisfaction levels.

Environment, community and costs matter

On carbon limits, surveyed members expressed modest concern. Those who are the least able to pay more (senior members and low-income households) expressed the most concern over planned regulations.

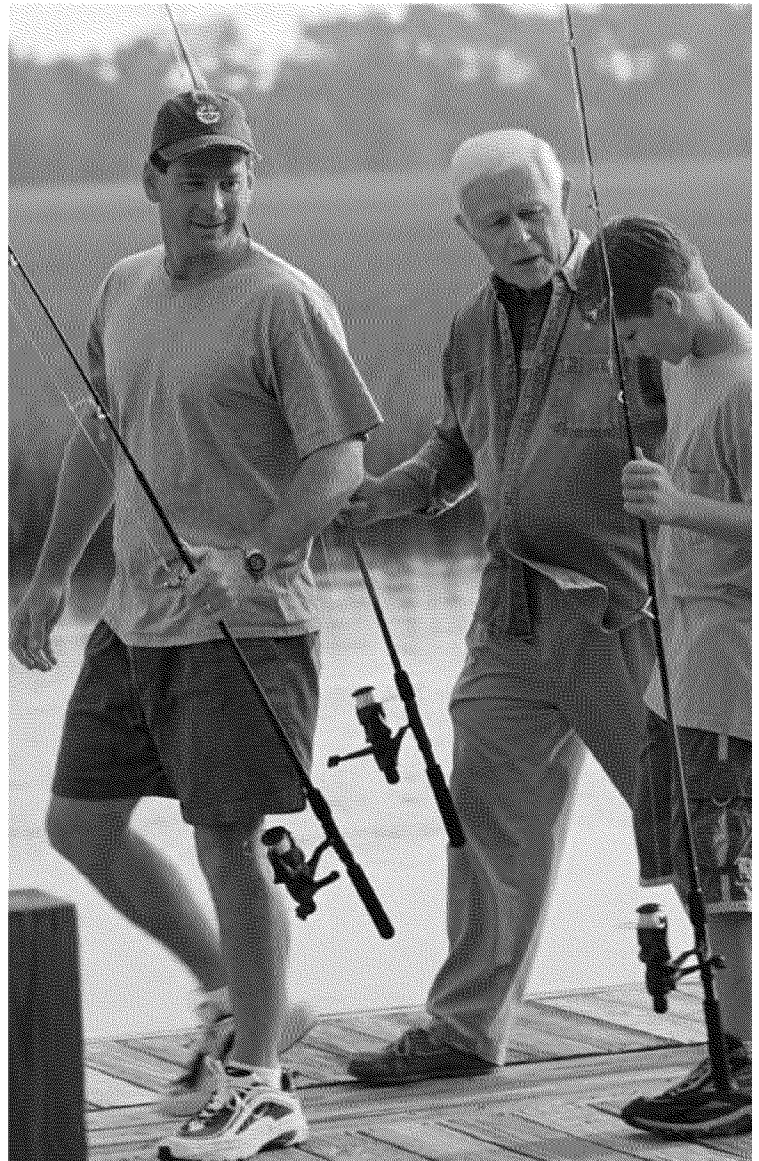
- Most members—96 percent—are not willing to pay more than 10 percent to address climate change. One-third said they're willing to pay some to support the effort to reduce carbon emissions.
- Interest in renewable energy options is growing, and 40 percent of respondents of all ages support community solar; however, most are not willing to pay more for it or to subsidize it for others.
- Members want their cooperatives to inform them about their work to attract and retain businesses and create jobs, the co-op's concern for community and the fact that their cooperative is member-owned.

Electricity powers lives

Most members own their homes, with most of these homes at least 25 years old. New homes (less than five years old) account for only about 4 percent of the homes surveyed.

Weather in the Midwest means members need heating and cooling systems for their homes.

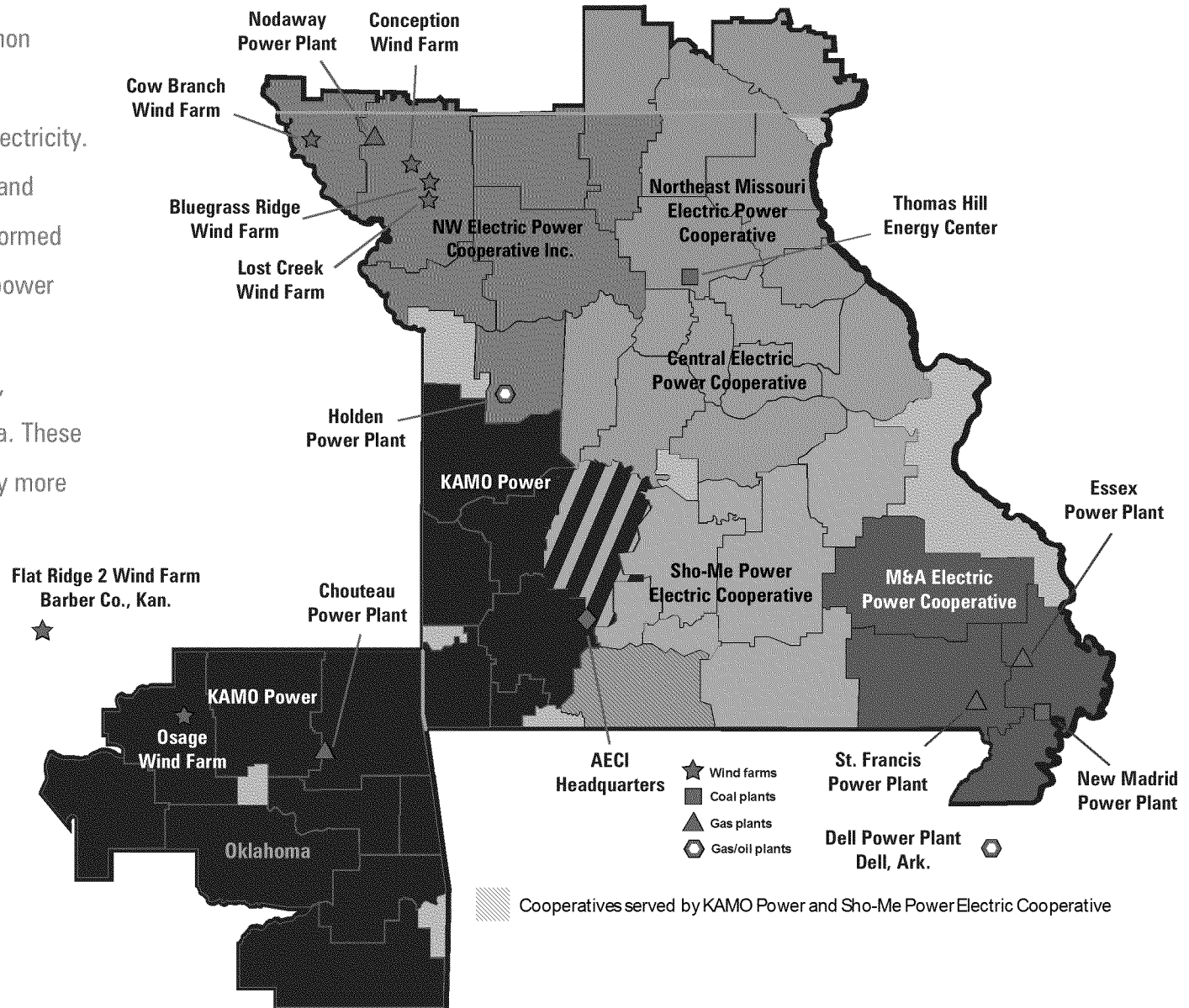
- Electricity is the primary energy source for heat in the home and has gained market share with newer homes.
- 68 percent of surveyed members use central air conditioning. Senior and low-income households have highest concentration of window units.
- Most members (70 percent) use electricity to heat water.
- About one in six members live in a manufactured, modular or pre-fabricated home.
- Energy consumption increases dramatically with larger households. A two-person household uses about 17,800 kilowatt-hours a year. A household of five or more uses 26,000 kWh per year.



Survey results of more than 12,000 members are accurate at the national benchmark of 95 percent with a confidence level of +/- 1 percent. To minimize bias, distribution of member age groups is gathered from publicly available data and used to establish age quotas for each cooperative sample.

Associated Electric Cooperative generates clean, affordable, reliable electricity for co-ops in three states

Associated Electric Cooperative is part of a three-tiered system united by the common purpose of serving electric cooperative members with affordable and reliable electricity. Associated is owned by six generation and transmission cooperatives (G&Ts) that formed it in 1961 to provide them a wholesale power supply. These six G&Ts are owned by 51 distribution cooperatives in Missouri, southeast Iowa and northeast Oklahoma. These local electric cooperatives are owned by more than 875,000 member-consumers.



Associated Electric Cooperative uses a mix of resources ... to supply clean, affordable, reliable electricity

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2016

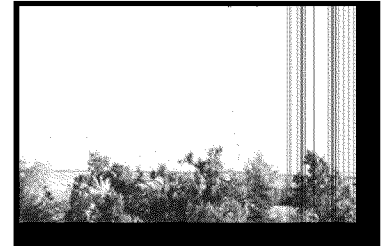
Coal
2,353 MW



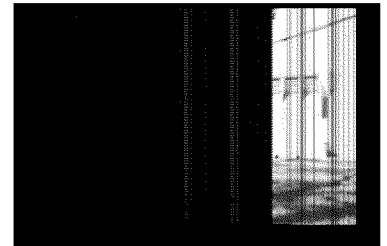
Natural gas
2,753 MW



Wind generation
750 MW



Hydroelectric
478 MW



Take Control & Save
A Cooperative Effort for Energy Efficiency

Environmental commitment

Associated Electric Cooperative Inc.

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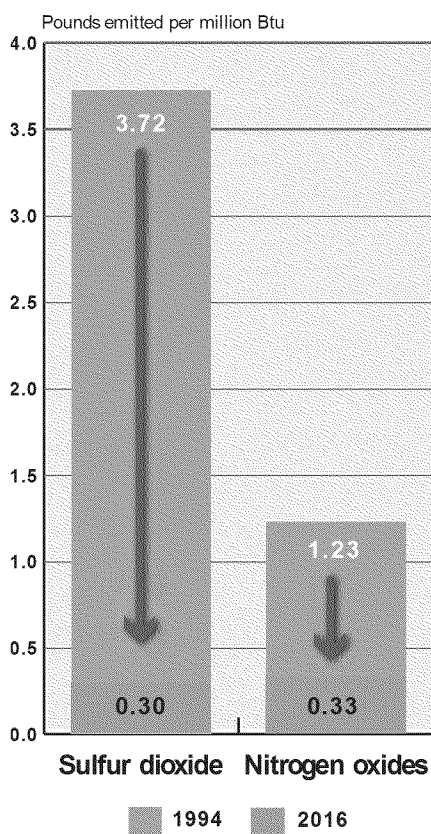


Power supply facts

AECI has history of environmental stewardship

Associated Electric Cooperative and its members have spent more than \$1.1 billion to reduce emissions since 1994, and we're proud of the tremendous improvements in air quality we have achieved. Our focus on serving members drives us to be good stewards of the environment and of our members' resources. Balancing these responsibilities will be even more important, as well as more difficult, in the future.

Associated improves air quality



Associated Electric Cooperative has improved air quality with significant investments and innovative research – and kept members' electricity reliable and affordable. Chart shows 1994 emissions from fleet comprised of coal units. 2016 reflects reductions achieved due to fleet diversity (coal and gas units) and investments in environmental controls.

1993-1995 – \$552 million to reduce SO₂ 90 percent

AECI spent \$552 million to close its Missouri mine and switch to cleaner, low-sulfur coal at its New Madrid and Thomas Hill power plants. This conversion reduced sulfur dioxide emissions (SO₂) nearly 90 percent to more than fulfill the requirements of the 1990 Clean Air Act Amendments.

2000-2007 – \$122 million to reduce NO_x emissions

- AECI installed selective catalytic reduction (SCR) equipment at its New Madrid Power Plant, at a cost of nearly \$100 million, that is designed to reduce nitrogen oxides emissions 90 percent.
- At both coal plants, AECI added a technology known as “over-fire air” on all units from 2004-2006 to further reduce NO_x emissions for a cost of \$15.5 million.
- Replacement low-NO_x burners were installed in 2006 on Thomas Hill Unit 3 to reduce NO_x emissions and lower operating costs on SCR equipment. The project, including burners and coal-flow measurement instrumentation, cost \$7.6 million.

2006-2009 – \$423 million to reduce NO_x 90 percent

AECI constructed environmental controls at its Thomas Hill Energy Center to further reduce NO_x emissions and fulfill air quality requirements. The \$423 million project included construction of SCRs on all three units; refurbishing Unit 3 equipment that captures tiny ash particles from emissions; and higher efficiency Unit 3 air heaters, needed with the SCR, that require less coal be burned to meet member demand for electricity.

The project was completed by Jan. 1, 2009, to enable AECI to achieve systemwide NO_x emissions reductions and comply with EPA requirements.

2009 to present

Associated broke ground as the first to reduce mercury emissions up to 80 percent with use of CyClean refined coal at its two coal plants, beginning in 2010. Associated invested another \$35 million to further reduce mercury emissions by improving equipment that captures fine particulates, installing activated carbon injection systems and air monitoring systems for mercury. The reductions, as well as Associated's conversion to low-sulfur coal, are part of Associated's proactive work to meet EPA's mercury rule, effective in 2016.

In addition to investing in environmental controls, Associated provides an energy efficiency program to members, is a leader in Missouri wind energy and has researched lower-cost technologies to reduce emissions and keep electricity affordable for its members.

Environmental controls increase costs, not MW

Environmental control measures to improve air quality costs Associated Electric and its members about \$45 million a year, including fixed and operating costs.

AECI reduces emissions & meets energy needs

Associated Electric Cooperative Inc.

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Power supply facts

Associated Electric Cooperative has diversified its resources, invested in environmental controls and taken innovative, proactive steps to research technology to comply with environmental regulations at the lowest cost possible for our members.

Members' investments have reduced emissions significantly, including 65 percent to 90 percent reductions in sulfur dioxide, nitrogen oxides and mercury emissions since 1994, despite increasing electricity demand.

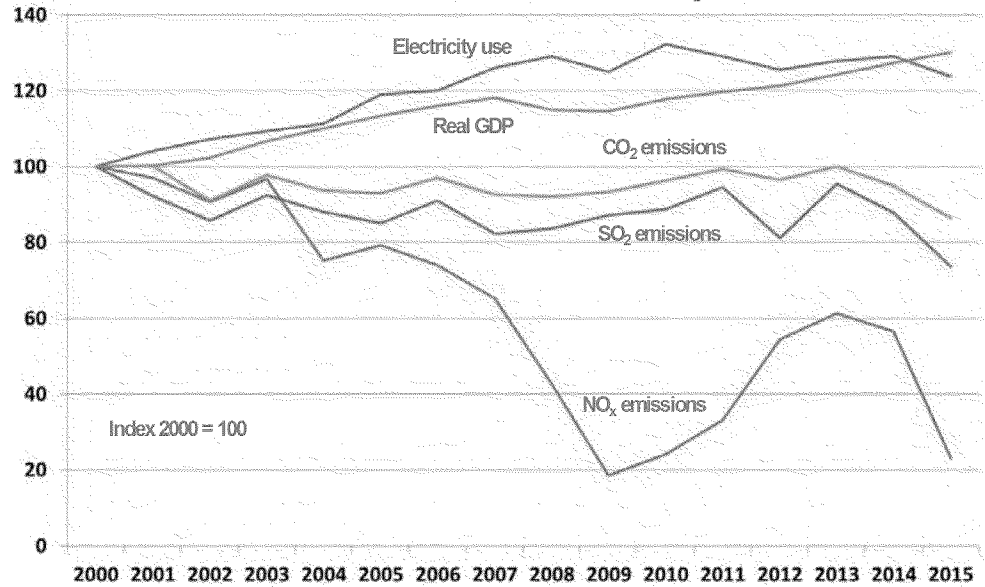
Associated Electric also has proactively managed its carbon footprint.

It has voluntarily added low-emissions natural gas plants, carbon-free wind power and energy efficiency to its coal, gas and hydropower resources, while keeping electricity affordable and reliable for member cooperatives.

As a result, Associated Electric's emissions rate for carbon dioxide has significantly and steadily declined in the last 15 years. Associated Electric now has 750 megawatts of contracted wind energy, including the addition of two large wind farms that significantly decreased Associated's amount of CO₂ emissions in the last five years.

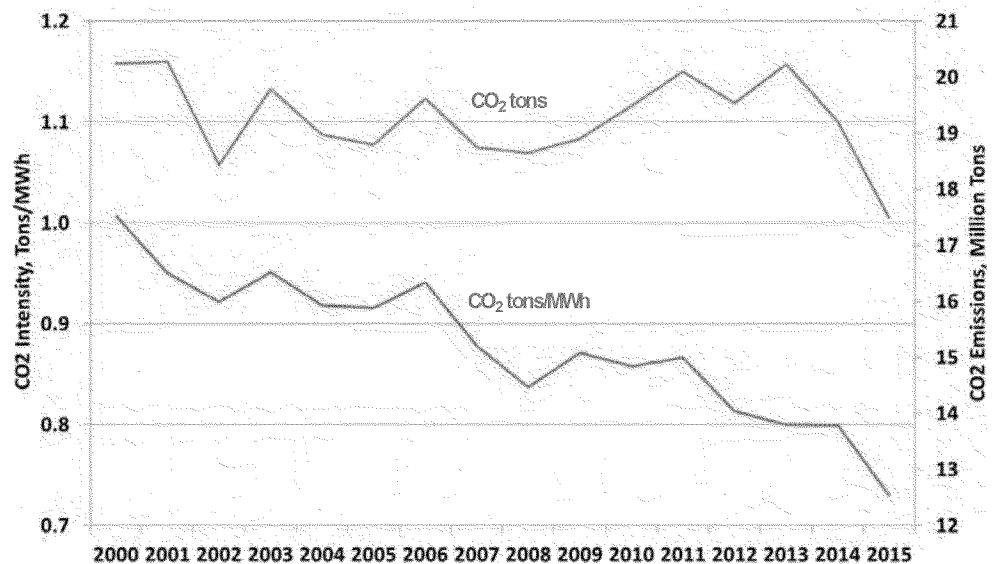
We've balanced our responsibilities to produce clean, affordable, reliable electricity, which has never been easy or inexpensive, and our commitment to environmental stewardship has never wavered.

AECI emissions down while electricity use increases



AECI's emissions have declined over the last 15 years despite increasing electricity demand and a growing economy. In this chart: 2000 represents the base year. Graph depicts increases or decreases from base year. Electricity use represents member load only. 2009 electricity use drop due to recession. Emissions represent coal and gas totals. GDP source: statista.com

AECI CO₂ emissions tonnage & intensity decrease



CO₂ tons represent the coal and gas fleet total emissions. CO₂ tons/MWh represent coal and gas fleet total emissions compared to the total generation mix of fossil fuel, wind energy and hydropower.

AECl has impressive record of improving air quality

Our focus on serving members drives us to be good stewards of the environment and of our members' resources. As retired rancher and former Associated board president O.B. Clark said, "Not to care for that upon which we depend for our living, for the resources entrusted to us, is simply ridiculous. The best environmentalists are the people out there depending on that land."

Our members have lived up to their responsibilities, investing more than \$1.1 billion since 1994 to improve air quality and care for our land and water resources. We spend about \$45 million a year on environmental control measures and their operations.

- Associated Electric was one of the first utilities to convert to 100 percent low-sulfur coal to reduce sulfur dioxide emissions 90 percent.
- We were one of the first to install equipment on large coal units to reduce nitrogen oxides emissions.
- Associated was nationally recognized by the U.S. Department of Interior for innovative and successful mine reclama-

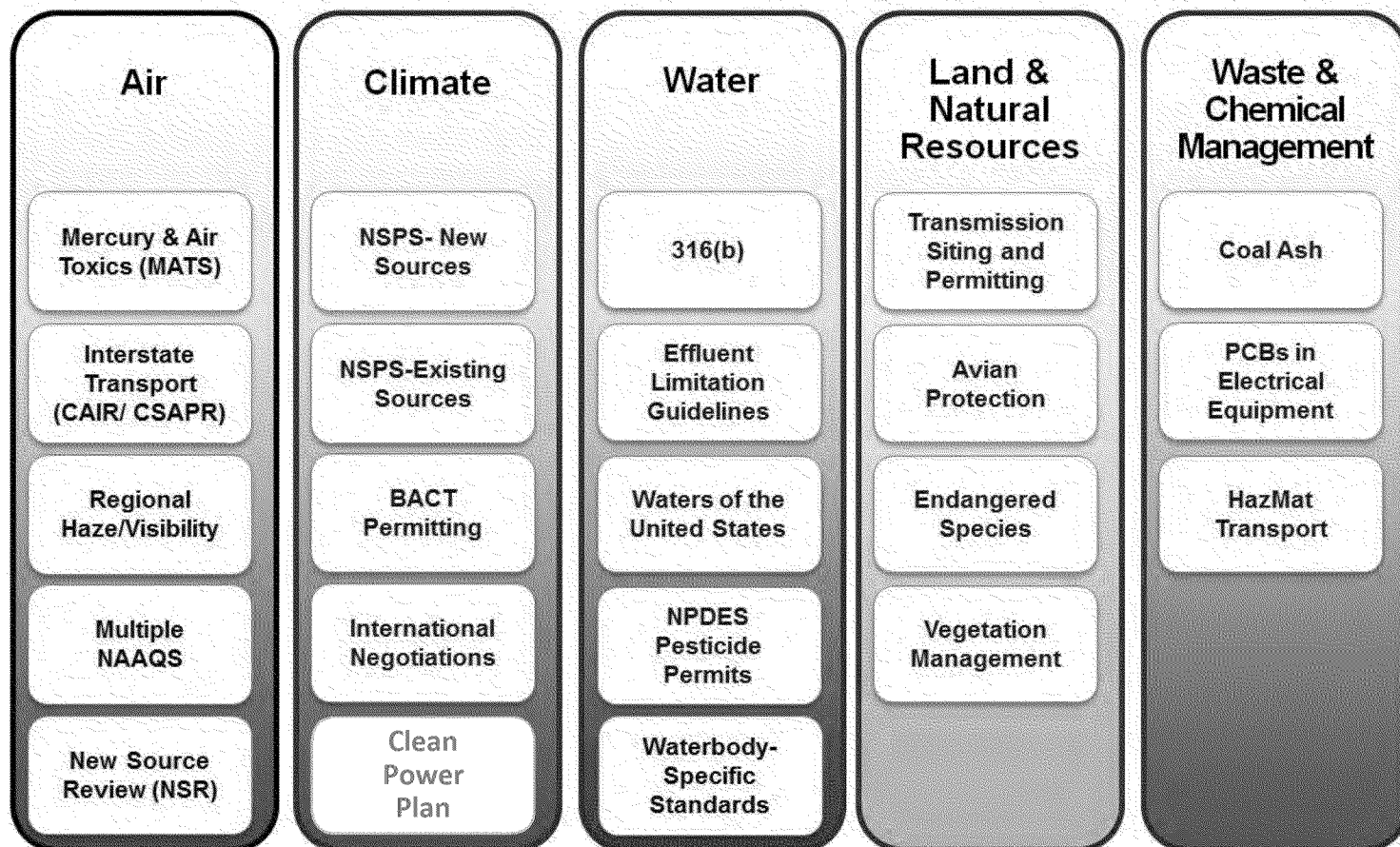
tion and restoration – twice earning this prestigious award.

- The co-op voluntarily began reducing mercury emissions years ahead of the 2016 compliance date by using a treated coal.

Associated Electric's switch to cleaner, low-sulfur coal at its New Madrid and Thomas Hill power plants in 1994 continues to position Associated well to meet additional regulations.


Despite Associated's excellent environmental record and innovative use of technology to control emissions at lower cost, more mandates from the Environmental Protection Agency on carbon and other air emissions, water quality and coal ash storage and handling threaten to significantly increase the cost of producing electricity for rural electric cooperatives.

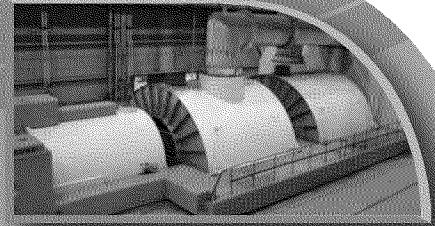
Environmental regulatory challenges continue, 2016 and beyond



Carbon costs

Associated Electric Cooperative Inc.

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Power supply facts

Controlling carbon will increase your cost of electricity

Associated Electric Cooperative, our wholesale power supplier, has invested in environmental controls and researched lower-cost technologies to achieve up to 90 percent reductions in nitrogen oxides and sulfur dioxide emissions, as well as reduced mercury emissions. Environmental control measures to improve air quality costs Associated Electric about \$45 million a year, including fixed and operating costs.

Those costs will increase as your wholesale power generator works to meet additional environmental regulations on air emissions, water quality and coal ash handling and storage – as well as new rules to reduce carbon emissions.

The Environmental Protection Agency issued its final carbon rule, the Clean Power Plan, Aug. 3, 2015, calling for a 32 percent reduction in carbon emissions nationwide by 2030.

States that rely on coal for affordable, reliable electricity were hit especially hard. Missouri must meet a 37 percent reduction target; Iowa, 42 percent reduction; and Oklahoma, 31 percent below 2012 levels.

Ultimately, the rule will reduce use of coal – which generated 63 percent of members' energy in 2016, and shift generation to natural gas plants and new renewable energy projects.

As expected, the Clean Power Plant plan was challenged.

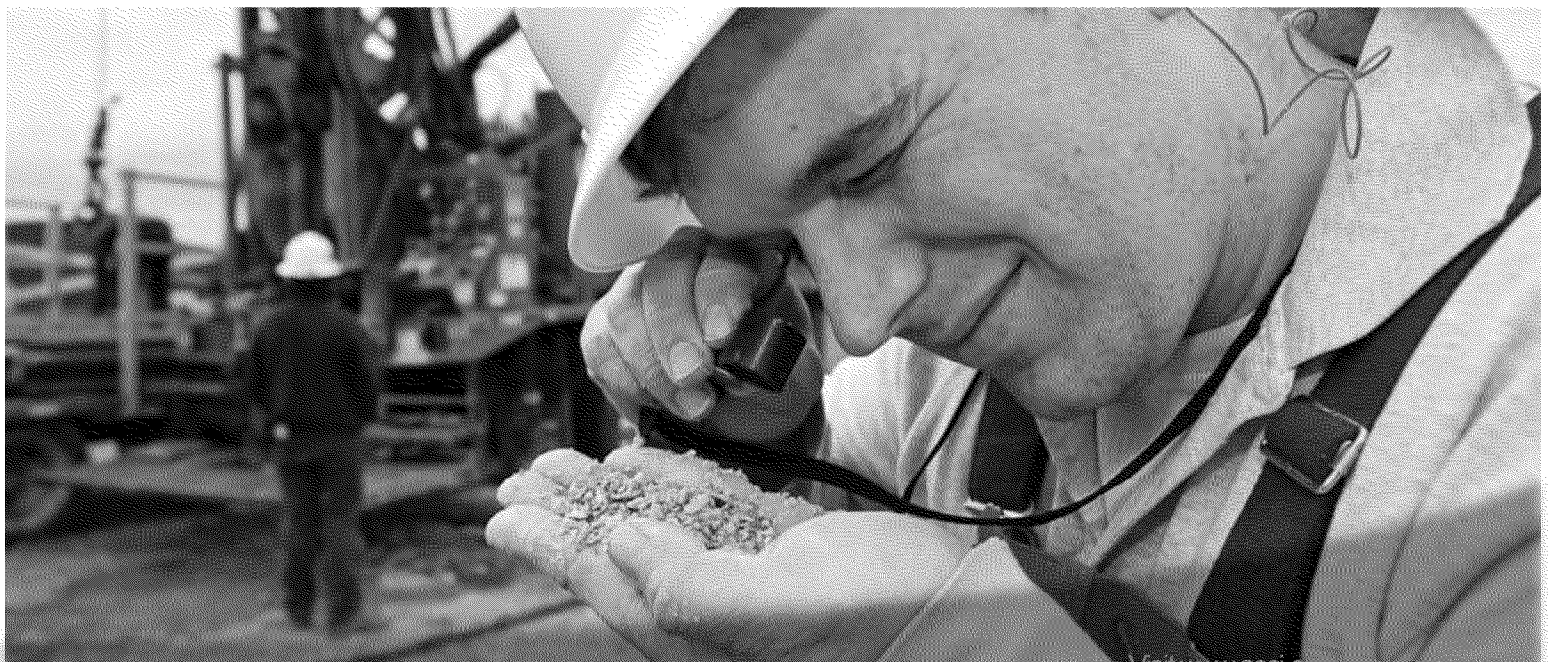
More than 20 states – including Missouri, Iowa, Oklahoma and Arkansas – filed suit against the plan. The National Rural Electric Cooperative Association also filed suit.

Reprieve came Feb. 9, 2016, when the U.S. Supreme Court issued an unprecedented stay of the regulation until legal challenges are resolved. In September 2016, the U.S. Court of Appeals for the District of Columbia Circuit heard nearly seven hours of oral arguments but has not yet issued a ruling.

The case is expected to end up before the Supreme Court, but with the new administration, cabinet and Supreme Court appointment to come in 2017, uncertainty continues on carbon restraints for power plants. With all that in mind, Associated's work to comply with the Clean Power Plan slowed in 2016; however, Associated staff participated in state planning meetings.

Associated and member systems have good working relationships with state agencies in Missouri, Oklahoma, Arkansas and

▼ *Missouri Department of Natural Resources geologist John Pate examines cuttings near Thomas Hill Energy Center to determine what bedrock the drilling has reached. Part of the carbon storage research project, supported by AECL and other utilities, was conducted at Thomas Hill Energy Center in north-central Missouri.*



Core carbon points

The threat of greenhouse gas regulations has long produced uncertainty for the utility industry. In 1997, the Kyoto Protocol was adopted, calling on industrialized nations to reduce greenhouse gas emissions. The American Clean Energy and Security Act of 2009, also known as the Waxman-Markey Bill, would have established a CO₂ emissions trading program. It was approved by the House of Representatives on June 26, 2009, but never brought to the Senate floor for discussion or vote.

Finally, in June 2014, EPA issued its proposed rule, followed a year later with its final “Clean Power Plan” published Oct. 23, 2015.

The final plan:

- Gives option of rate-based program (emissions of CO₂ per MWh) or a mass-based (tons of CO₂ per year) cap-and-trade program
- Encourages replacement of existing coal plants with new renewable energy sources
- Drives creation of an emissions trading program among states – similar to past cap-and-trade legislation that failed to receive congressional approval
- Does not fully address reliability concerns due to lack of time to plan, site, permit and build generation and transmission facilities to meet nation’s new generation mix
- Gives no relief for stranded investments
- Provides incentives for helping low-income households implement energy efficiency measures that may benefit member-consumers.

Kansas, where it has generating assets. Associated will continue to advocate for keeping electricity affordable and reliable for members as legal challenges progress.

Reducing our carbon footprint

Associated has a long history of proactively managing its environmental responsibilities in balance with its mission to provide an economical, reliable power supply to member systems.

In the last 20 years, Associated Electric and its members have invested more than \$1.1 billion to improve air quality and care for land and water resources – and achieved tremendous results.

Associated also has worked to manage its carbon footprint. It has diversified its generating mix, adding lower-emissions natural gas plants, carbon-free wind power and energy efficiency to its coal, gas and hydropower resources, and it has participated in research like the carbon capture and storage project at Thomas Hill.

Take Control & Save energy efficiency program

The Take Control & Save energy efficiency program is seeing results since its launch in 2008. To date, Associated and participating cooperatives have invested more than \$49 million in the program that will achieve an estimated cumulative lifetime savings of 1.4 billion kilowatt-hours – enough electricity to run more than 86,000 member households for a year.

While the program helps members reduce their electric bills, it reduces generation, which reduces carbon emissions.

Wind generation

Associated and rural electric cooperatives took the lead in carbon-free wind power when they teamed up to bring the first utility-scale wind farms to Missouri, totaling 300,000 kilowatts.

Associated then signed long-term power purchase agreements for 300,000 kilowatts from the Flat Ridge 2 Wind Farm in Kansas and for 150,000 kW from a farm in Oklahoma. The contracts lock in fixed wind power costs while adding geographic diversity to AECI’s wind power resources. Total wind capacity is now 750,000 kW.

Renewable hydropower

Hydropower from federal dams in Missouri, Oklahoma and

Arkansas is another major renewable generating resource. While hydropower is one of our lowest-cost resources, it is a limited commodity dependent on rainfall and the capacity of lakes and dams to store the water.

Carbon capture and storage research

Associated has participated in research to find ways of reducing the amount of carbon dioxide reaching the atmosphere.

Associated partnered with other Missouri utilities and the U.S. Department of Energy in a three-year project to determine the feasibility of storing CO₂ in a saline aquifer in Missouri. Testing at Thomas Hill Energy Center showed it was a viable site for storage. More testing and funding are needed to continue the research.



AECI moves ahead on CCR rule for coal ash

While further improving air quality in 2016, Associated Electric Cooperative also accomplished a number of projects related to EPA's Coal Combustion Residuals rule that regulates handling of fly ash and bottom ash. EPA's final CCR rule was effective Oct. 19, 2015, and overall is much stricter than the 2010 draft.

Closely tied to the CCR rule is the Clean Water Act Effluent Limitation Guidelines, issued in fall 2015. This further regulates water discharged from power plants, adding monitoring for additional metals and toxics, and includes Thomas Hill units 1 and 2, previously excluded due to their smaller size. Associated will comply with the effluent guidelines between 2018 and 2023, when it renews discharge water permits at the coal plants.

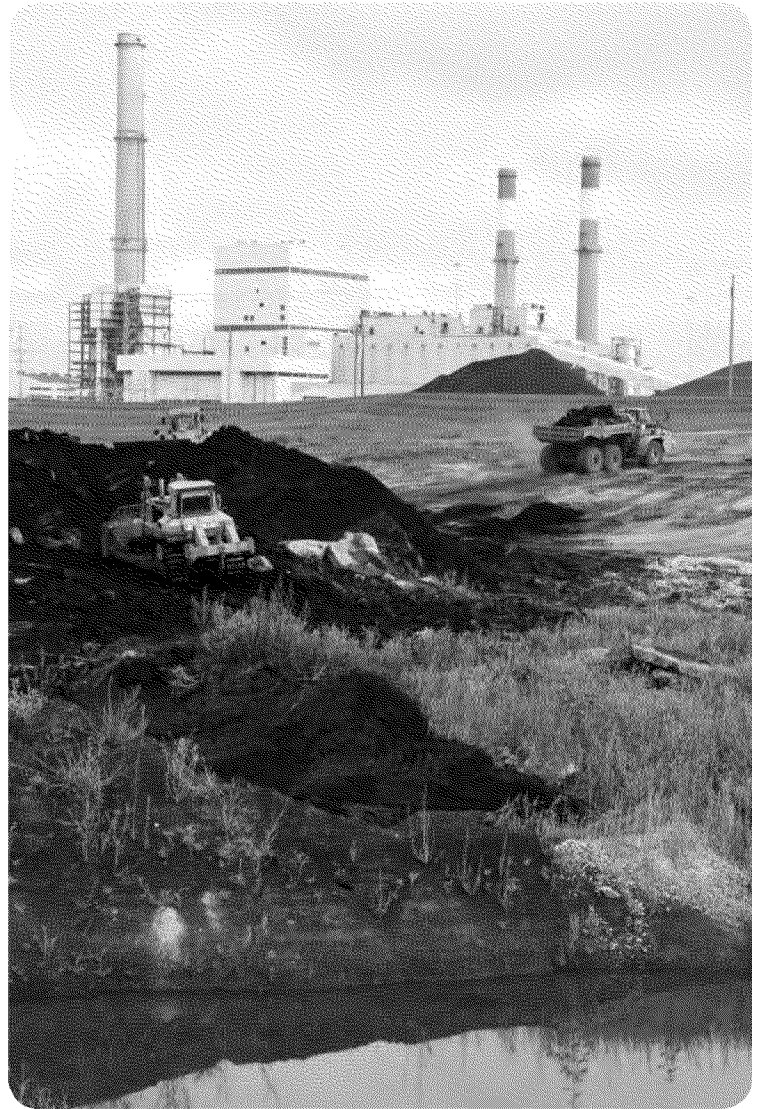
Combined, these two regulations will significantly increase ash-handling costs.

Associated prepared for these regulations and converted both coal plants from wet to dry fly ash handling systems, started development of groundwater monitoring programs and researched options for compliance on its ash ponds.

In 2016 staff completed construction of a second cell at Associated's permitted utility waste landfill near New Madrid Power Plant.

Staff met the October 2016 CCR deadline to document the history of ash pond construction and develop closure and post-closure plans for ash ponds and the landfill. All of this information was posted on its public-facing CCR website, as required.

Associated installed additional groundwater wells at both coal plants in 2016. Associated historically has monitored groundwater around its reclaimed mine and at the New Madrid landfill; however, the CCR rule requires more wells and parameters specifically for monitoring around ash ponds and the landfill. Baseline data from the wells will be analyzed in 2017 to determine background concentrations for required parameters.



At Associated's Thomas Hill Energy Center, coal yard crews removed about 74,000 tons of bottom ash in 2016 from an inactive ash pond, preparing it for closure and doing the work in-house to reduce costs.

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Putting ash to good use & safe disposal

Associated Electric Cooperative Inc.

A Touchstone Energy® Cooperative

Power supply facts

Associated works to meet new ash regulations, reduce costs

The Environmental Protection Agency finalized its coal combustion residual rule Dec. 19, 2014, governing coal ash handling and disposal at coal plants.

There was good news in the new rule: Coal ash remained categorized as a nonhazardous waste, enabling Associated Electric to continue to recycle both fly ash and bottom ash, which it's done for 20 years. Recycling ash reduces landfill use – benefiting the environment – and brings in revenue to help keep members costs affordable.

This was a big win for cooperatives, which had advocated for keeping coal designated as nonhazardous. Cooperatives continue to work with legislators to make this designation a certainty, which the law did not provide.

However, the final rule also includes stricter seismic zone requirements that were not present in the 2010 proposed rule, and those requirements could cost millions of dollars due to retrofits or closure of ash retention ponds at New Madrid Power Plant, as well as result in significant cost increases for transporting the ash for disposal.

The New Madrid Power Plant is about the only plant in the country affected by the new seismic requirements, which increased requirements from a 500-year earthquake event to the much stricter 2,500-year earthquake event. Associated is working

with NECA, state and with the EPA and legislators to address

The seismic requirements also may affect Associated's ability to use its fairly new utility landfill at New Madrid, which was built in 2008 and permitted for 10 cells. One cell is being used. Opening a second cell designed to meet the new criteria will cost about \$72 million. Opening one \$50 million utility landfill costs about off site.

Seismic zone requirements are part of several new criteria in the rule that will increase ash-handling costs, as well as the cost

[more information on back](#)

Associated gets high marks

EPA inspected Associated's facilities in 2010, and Thomas Hill Energy Center earned EPA's highest safety rating. New Madrid Power Plant received EPA's second highest rating and is implementing recommendations for improving erosion control and vegetation management.

Associated uses coal ash for mine reclamation and sells it for other uses, including cement substitute, reducing the amount disposed.

of constructing new ash facilities. The rule affects all ash ponds, used mostly for processing the coarser bottom ash from the coal units at Associated.

Associated staff continues to develop its compliance plan. At New Madrid Power Plant, options include retrofitting two unlined ash ponds; closure of those ash ponds; or converting to a dry system for bottom ash.

Working ahead to ensure compliance

At New Madrid, Associated proactively converted to a dry system for handling fly ash and increased groundwater monitoring. Additional groundwater monitoring wells will be needed at both plants.

Converting to a dry system for handling bottom ash at New Madrid Power Plant will cost about \$30 million. The rule has less impact at Thomas Hill Energy Center, which also proactively converted to a dry fly ash-handling system and is closing its ash retention pond. Associated also built a pad for bottom-ash handling to comply with the new rules.

The rule allows for continued beneficial use of ash for mine reclamation, which is done at Thomas Hill.

Groundwater monitoring was expected and is required for all ash ponds and landfills under the new rule. Associated will install additional groundwater monitoring wells at both plants, analyze the data and report findings regularly.

The CCR rule is tied to Clean Water Act Effluent Limitation Guidelines, finalized in September 2015, that will affect water discharged from power plants. A 2013 draft added pollutants that may require more water treatment or modifications to ash handling.

Staff continues to review the 745-page CCR rule, as well as the new effluent guidelines, conduct more detailed seismic analysis at New Madrid and research lowest-cost options for compliance.

The final rule was published April 17, 2015, in the Federal Register. Compliance starts six months to 48 months from April 17, depending on the criteria. Legal and legislative action also is expected, so some uncertainty will continue as it has since 2008, when the large coal ash spill at TVA's Kingston facility prompted EPA to develop the rule.



Closed trucks take dry fly ash from the plant.

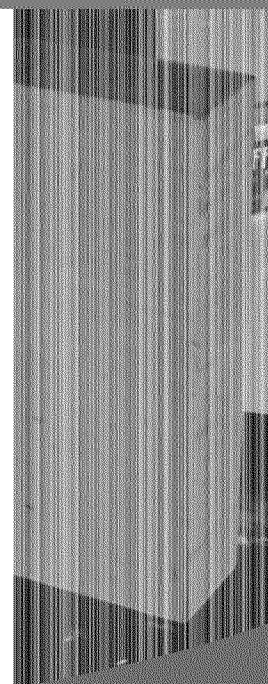
Co-ops recycle ash for 20 years

Associated manages coal ash byproducts at its plants by using a combination of "beneficial use" mine reclamation, recycling and reselling, and long-term storage using permitted lined ash ponds and utility waste landfills.

Associated has sold bottom ash, a heavier material from the bottom of the cyclones, from both Thomas Hill and New Madrid plants since 1994 for use as an aggregate in roof shingles. From 2002 through 2014, it recycled about 983,000 tons of bottom ash to bring in \$1.25 million in revenue.

Since 1998, it has sold fly ash from Thomas Hill Unit 3, a pulverized unit that produces ash lower in carbon, for use in making concrete. It's also partnered with a University of Missouri scientist to create a super-strong "green" brick now licensed for manufacturing.

From 1998 through 2014, Associated sold about 825,000 tons of fly ash, bringing in about \$6 million in revenue. Recycling the ash reduces landfill disposal also.



Visit www.aeci.org

B19-10-26-2015

AECI reduces mercury emissions years ahead of time

Stewardship has always been part of the culture at Associated Electric Cooperative, which prides itself on producing affordable, reliable electricity balanced with protecting the natural resources that our members depend on for their livelihoods and quality of life.

Often, Associated Electric has taken the lead with innovative, cost-effective and proactive solutions. It did the same thing when it came to meeting the Mercury Air Toxics Standards, effective in April 2016 for the cooperative.

Staff started early to craft its compliance plan, and the parts worked together to put Associated's emissions of mercury, particulate and hydrogen chloride well below the new requirements set by the Environmental Protection Agency.

In 2016 Associated finished \$35 million in projects and met two important MATS deadlines. First, it was compliant when the rule took effect. It then met the 180-day deadline in October 2016 to demonstrate that compliance, which required submitting scores of testing data and certifications.

Meeting MATS requirements took a concentrated effort from staff throughout the cooperative, particularly by the environmental, health and safety department, laboratory and instrument controls teams at each of the coal plants.

AECI started reducing mercury 20 years ago

Associated began reducing mercury emissions long before the Environmental Protection Agency proposed its first mercury rule in 2005.

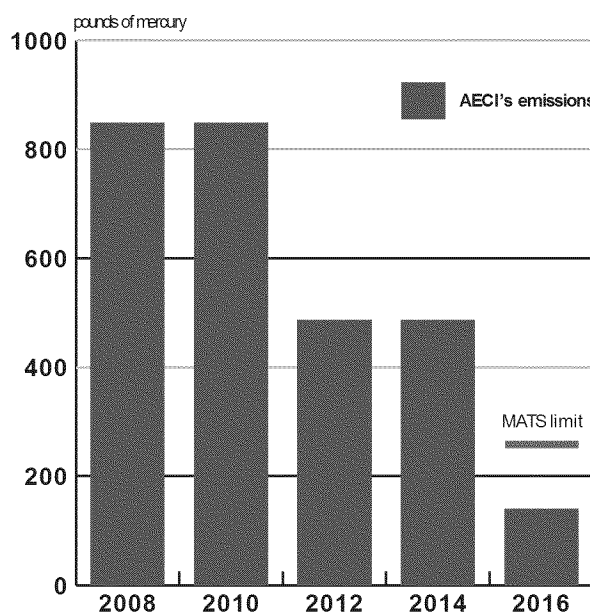
In 1995, Associated converted all five coal units to low-sulfur coal – one of the first in the country to do so – and reduced sulfur dioxide emissions 90 percent. Lower in mercury and hydrogen chloride too, this coal forms the foundation for Associated's air quality compliance.

In 2011, Associated reduced mercury emissions another 40 percent from its cyclone units when employees led the nation with implementation of refined coal technology. This was added in 2014 on Thomas Hill Unit 3, a pulverized unit, also decreasing its mercury emissions 40 percent. The technology also reduces costs, amounting to fuel savings of \$7.8 million in 2016, through contracts for use of refined coal related to a President George W. Bush-era stimulus package.

After MATS was published in 2012, Associated invested in and completed construction of activated carbon injection systems on all five coal units; completed maintenance on three coal units' electrostatic precipitators to improve capture of particulate matter, reducing these emissions to one-half of the MATS standard; and installed sorbent trap monitoring

systems on the three largest coal units. However, Associated's smaller Thomas Hill units 1 and 2 are very low-emitting units and only require periodic emissions testing, which reduces costs.

AECI reduces mercury 85 percent



Overall, Associated has reduced its mercury emissions about 85 percent compared to baseline emissions in 2010, before any refined coal or activated carbon injection emission controls, and is below the MATS requirements today.

Associated Electric Cooperative Inc. is owned by and provides wholesale power to six regional and 51 local electric cooperative systems in Missouri, southeast Iowa and northeast Oklahoma that serve more than 875,000 customers. AECI's mission is to provide an economical and reliable power supply and support services to its members, including the "Take Control & Save" energy efficiency program, www.TakeControlAndSave.coop. AECI is a Touchstone Energy Cooperative; an Equal Opportunity Employer and provider/disability/veteran. Associated Electric Cooperative, © 2017, all rights reserved.

Another piece of the past erased and replaced

A recent bond release on 26 acres at Thomas Hill Energy Center was another step in the return of land once used in Associated Electric Cooperative's past mining operations. The released acreage surrounds the site of the preparation plant, built in the early 1980s to wash high-sulfur coal mined nearby, said land agent Kevin Murphy.

The 26 acres by the power plant is now leased to nearby farmers for hay production. Kevin said it's been productive for more than five years – the time period needed before released by the state agency regulating reclamation.

With this release, all that remains of the once 16,442 acres under bond is 807.3 acres that Associated uses for permitted ash disposal as part of its solid waste plan. This land consists of three former mine pits, which provide a safe and efficient method for ash disposal in close proximity to the power plant, a soil borrow area and top soil stored for reclamation.

Better than before

Associated was in the mining business from 1980 to 1993, when it shut down its mine and converted its coal units to burn low-sulfur western coal – reducing sulfur dioxide emissions 90 percent – to meet 1990 Clean Air Act Amendments.

In 1993, Associated had 16,442 acres under bond. For the most part, bonded land was mined or disturbed in some way, Kevin explained, and could include mined land, haul roads, coal preparation areas, soil borrow areas or stockpiles.

Subject to the Surface Mine Reclamation Act, Associated was required to post a reclamation bond for each acre disturbed. Bonds act as insurance in case a company goes out of business and cannot finish reclamation.

Portions of the bond liability were released as mined areas

were graded to approximate original contours, topsoil replaced and vegetation established to control erosion.

For acreage to be released, Associated must complete three phases of reclamation:

Phase I: Backfilling and rough grading, replacement of topsoil and initial seeding.

Phase II: Establish vegetation to control erosion.

Phase III: Begin the minimum five-year productivity demonstration.

Most reclamation work was completed in 1998 with a \$1.8 million bond release on 1,377 acres of mine property. This was followed by 59 more bond releases through 2011, totaling 7,362 acres and \$6.8 million in bond liability.

Since completion of the many reclamation projects, overall land management has become a focus for Associated, Kevin said. Resources are now more available to maintain or improve more than 30,000 acres owned around and near the Thomas Hill plant. That acreage includes the Thomas Hill Lake and surrounding land leased and managed by the Missouri Department of Conservation.

Associated's stewardship and return of land resources to original or better condition has been recognized nationally. The cooperative twice received the U.S. Department of Interior's highest honor for its innovative, successful reclamation that improved water quality and transformed acres mined by a previous owner into productive pasture, wetlands and forest.

The Interstate Mining Compact Commission recognized Associated as a national leader in mine reclamation with its 2007 Kenes C. Bowling National Mine Reclamation Award.

Learn more at www.aeci.org

Today on formerly mined land at Thomas Hill Energy Center, as well as on land never mined, are ponds that provide fishing and wildlife habitat, woodlands that give shelter to many species, land leased to neighboring farmers for pasture and hay, and acres for crop and wildlife research underway.



Co-ops protect members and mammals

Associated Electric Cooperative Inc.

A Touchstone Energy® Cooperative 

Power supply facts

Working together, Associated Electric Cooperative and the Association of Missouri Electric Cooperatives developed an agreement with the U.S. Fish and Wildlife Service that protects habitat for endangered species, like the Indiana bat, and ensures reliable transmission for members.

The innovative agreement was noted by the Conservation Federation of Missouri, which presented the association with its esteemed Conservation Organization of the Year award.

Member cooperatives also received recognition with the Outstanding Achievement Award in environmental stewardship from the Missouri Waste Control Coalition for cooperatives' environmental work, including the habitat preservation agreement.

Associated Electric and its member systems have a history of balancing members' needs for affordable, reliable electricity with environmental stewardship.

The integrated high-voltage transmission system owned by Associated Electric Cooperative and its six owner generation and transmission cooperatives is vital to providing reliable power to member cooperatives.

But, like many other aspects of the utility industry, the planning, construction and maintenance of that transmission system faces increasing challenges.

When a G&T's planned transmission line met a roadblock, the one-quarter ounce Indiana bat, cooperatives went to bat for members and the mammal.

Co-ops go to bat for members and mammals

Summer is a sensitive phase in the migrating Indiana bat's life cycle. In the past the U.S. Fish and Wildlife Service prohibited any brush or tree clearing from April 1 to Oct. 31, when bats could be present.

Associated and the G&Ts abided by this requirement, but when one of its G&T owners proposed to clear for a



Indiana bat

While much of the news on environmental issues centers on air quality, Associated and its six owner G&Ts also face environmental challenges when it comes to transmission line construction and maintenance.

Matters for members

The member-owned integrated high-voltage transmission system is vital to providing reliable power to member cooperatives. Like many other aspects of the utility industry, the planning, construction and maintenance of that transmission system faces increasing challenges.

transmission line in winter on land where no bats had been located, it was told the rules had changed. Clearing would not be allowed unless mitigation, in the form of a monetary payment, was provided.

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The potential impact of the new requirement on costs and reliability prompted Associated, AMEC and the six G&Ts to contact the U.S. Fish and Wildlife Service and propose an agreement that would keep power reliable and affordable for members and protect the Indiana bat.

Under the approved agreement, Associated and its member systems continue to implement voluntary measures to avoid and minimize impacts to the bat and its habitat. Instead of cooperatives' paying into a fund, cooperatives will continue to

The Indiana bat is getting more attention due to growth in the wind power industry, deaths of bats from white nose syndrome disease and the species' continuing decline.

The Indiana bat was added to the endangered species list in 1973. It lives in the Midwest to eastern U.S., as well as parts of southeastern Canada. In Missouri, it hibernates in caves in the Ozarks and southeastern part of the state.

In summer, pregnant bats migrate north to have their pups under the bark of exfoliating trees, often returning to the same area each year.

Transmission rights of way also may provide beneficial habitat for the bats, including better sun exposure to suitable roost trees, new "edge" habitat beneficial for foraging and open flight paths that are connected to forests.

provide many benefits to the bat through conservation measures, including following historic, recommended tree clearing guidelines, restoring habitat to natural conditions and conducting educational activities about preserving bats and their habitat.



This bat mansion is located on property in the Thomas Hill mine area. Below, a university student, holds a bat "rocket house."

Bats and Robbins



Associated Electric Cooperative also is working with Missouri State University professor Lynn Robbins to develop artificial habitat for the Indiana bat.

Robbins has placed 10 structures, including four utility poles (wrapped with artificial bark) provided and installed by Northeast Missouri Electric Power Cooperative, at Thomas Hill Energy Center. An initial habitat assessment of the Thomas Hill area showed it has the necessary characteristics for the Indiana bat to be present.

The project started in early spring 2012, when bats were migrating north in search of summer roosts under the bark of trees. Studies have shown man-made structures have been used by the Indiana bat, although it's not common.

The structures are located at Bee Veer and Prairie Hill mines, and researchers are evaluating evidence of their use.

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