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TO OUR STAKEHOLDERS:
For more than 100 years, Ameren’s family of companies has provided the electricity and natural gas vital to our customers’ lives—and the life of our economy. We’ve been able to offer safe, reliable and affordable energy because of our focus on disciplined cost management and efficient operations, as well as access to traditionally low-cost generation sources, such as coal and nuclear.

As a result, Ameren consistently delivers industry-leading value to our customers.

Today, however, America’s investor-owned utilities are operating in an increasingly dynamic business environment. This is a time of rapidly advancing technologies, fluctuating market forces, increasing regulatory mandates and evolving customer expectations. With changes come challenges … but also opportunities.

That’s why Ameren has a comprehensive corporate strategic planning process, so that we can prepare for and respond to change. The purpose of this “Point of View 2012” document is to build a foundation for strategic planning efforts. In it, we discuss our viewpoints around 10 planning areas of critical importance to our business:

- The Economy
- Technology
- Climate & Environmental Policy
- The Future of Coal
- Natural Gas
- Power Prices
- Nuclear
- Renewable Energy
- Transmission
- Customer of the Future

In developing our views, we gathered our best thinking internally and considered perspectives from multiple external experts and information sources. Our intent is not to forecast the future. Rather, we want to challenge and expand our thinking about the future of our business.

Developing and communicating a consistent perspective across these issues supports our segment leaders as they formulate strategic direction.

We also created this document to help you—our stakeholders—better understand our dynamic industry and the energy issues that matter in your lives. I hope you’ll find our “Point of View 2012” both informative and enlightening as we share our perspectives on key areas.

Finally, I’d like to note that our planning efforts are guided by Ameren’s vision: “Leading the way to a secure energy future.” We carefully craft our culture so that each employee understands his or her role in realizing this vision. It informs every decision we make and action we take to support our focus on building value: strong returns for shareholders, excellent service for customers and a deep commitment to the vitality of communities. Our vision embodies our approach to change, so we can continue to provide the energy our region needs … not just today, but for generations to come. That’s our promise to you.

Sincerely,

Thomas R. Voss
Chairman, President and Chief Executive Officer
Ameren Corporation
ABOUT OUR FINDINGS

- **Observations and insights** ... will help us develop corporate strategy and five-year plans that position our company for long-term growth, as we focus on creating value for life.

- **Our Point of View** ... will advise Ameren management in making decisions that have long-term effects. The decisions we make today can shape results tomorrow for shareholders, customers and co-workers.

- **Key drivers** ... will help us develop a cohesive set of relevant signposts. We’ll monitor these so we can provide ongoing insights regarding changing conditions that may affect our business.

ABOUT OUR STUDY PROCESS

Two years ago, Ameren undertook a similar strategic initiative and developed our “Point of View 2010.” Since then, several market and regulatory events have prompted us to revisit and update our Point of View for 2012.

For example, shale gas extraction has become a transformational technology, and we’ve seen support for passing carbon cap-and-trade legislation soften. Meanwhile, the economy’s recovery from the Great Recession continues to be slow and uncertain.

Our “Point of View 2012” scenario planning effort was based on the process used in 2010, but enhanced by forming a Lead Team and Steering Committee to provide corporate-wide oversight and ensure wide-ranging dialogue, while driving to a consistent set of key planning assumptions. Individual planning topic teams (comprising internal subject matter experts and business unit leaders) were tasked with developing long-term, 20-year views of topics under four different scenarios exploring potential future outcomes.

*Detailed descriptions of the 2012 scenarios—Grid.com, Depression 2.0, Big Government, and Hydrocarbon Boom—are outlined starting on Page 11.*

LEAD TEAM

Steve Kidwell  Vice President, Corporate Planning
Ajay Arora  Director, Corporate Development & Project Management
Richard Smith  Manager, Research & Development

STEERING COMMITTEE

Scott Bond  Manager, Nuclear Development
Scott Glaeser  Vice President, Gas Transmission & Supply
Glen Justis  Manager, Transmission Risk & Capital Management
Liz Lahm  Director, Business Risk Management
Mark Lindgren  Vice President, Human Resources
Geralynn Lord  Director, Identity & Customer Education
Mike Menne  Vice President, Environmental Services
Mike Mueller  Vice President, Energy Trading & Fuel Commodities
Bob Neff  Director, Coal Supply
Stan Ogden  Vice President, Customer Service & Metering Operations
Shawn Schukar  Senior Vice President, Trading & Marketing
Mark Vantrease  Manager, Strategic Planning
Steven Wills  Managing Supervisor, Quantitative Analytics
Scott Wiseman  Vice President, External Affairs
THE BIG PICTURE

WHAT WE OBSERVED

Key takeaways from our analysis include:

- **Advances in horizontal drilling and extraction technologies** have opened up vast, economically viable reserves of natural gas—providing abundant supply and low prices.

- **Coal-fired generation is being impacted** more swiftly than has been assumed in the past, in large part by low natural gas prices and environmental regulations.

- **Technological innovations have the potential** to significantly enhance the operation and control of the electric grid. At the same time, they could greatly shape the utility business model of the future.

- **Electricity demand continues to grow**, but at a pace that’s more modest than in years past. This is due in part to energy efficiency trends, but also to slower economic growth. This makes it more difficult to make needed investments in our energy infrastructure while keeping rates low.

OPPORTUNITIES TO CREATE VALUE

Our study also reveals important ways in which Ameren can direct our investments to create long-term value for stakeholders—our customers, communities and shareholders. This includes investing in:

- **Our core utility businesses**, both electric and gas, where significant opportunities exist.

- **Transmission infrastructure** that supports system reliability, delivers multiple benefits and connects new generation resources.

- **Our energy generation mix**, as we transition the existing portfolio to cleaner technologies—such as natural gas combined cycle, renewables or small modular nuclear.

- **A build-out in midstream natural gas infrastructure**, as the current long-haul interstate pipeline system is reconfigured to connect regions with shale gas to loads.

- **A range of technologies**, including those needed to modernize the electric grid for the future, as well as technologies that can help us improve/expand our product and service offerings for customers.
OPPORTUNITIES TO LEAD THE WAY

Ameren’s Point of View acknowledges challenges that face the energy industry in general and our company specifically. But in order to realize our vision, we believe in taking a proactive approach to meeting these challenges:

• Strengthening our relationship with customers
  Looking forward, we must appreciate how technological innovation might influence our customers’ preferences and, in turn, our business. For example, advances in “smart” technologies and smaller-scale, cleaner generation may enable more choice and independence. Meanwhile, customers’ interactions with other companies’ digital/mobile tools will shape their expectations of their utility’s offerings.

• Finding the right balance of reliable, affordable and responsible generation sources
  The continued use of coal will be challenged under any potential long-term outlook. Ameren is committed to identifying the appropriate balance of future energy sources. In doing so, our company and our stakeholders should consider that the alternatives to centralized generation—e.g., renewables and “distributed” generation—are not yet proven as both reliable and cost effective, compared with generating electricity with coal, nuclear and natural gas. (“Distributed” refers to power being produced in a non-centralized way, such as by individual households.) While offering improved environmental performance, natural gas-based generation also produces greenhouse gases, which may be challenged in the future. Also, new natural gas infrastructure must be developed to enable replacement of large amounts of coal generation.

• Improving the economic vitality of our region
  From a utility perspective, economic growth is the primary engine to grow demand for electricity. But from a broader perspective, economic growth and job creation is absolutely essential to the communities Ameren serves—and we can be an engine to help fuel that growth. Our current analysis projects that as the national recovery continues, the regional economic growth rate will be slower than the national trend. So it’s essential that we work together with stakeholders to significantly change long-term trends of the cities and towns we serve—attracting and retaining businesses, while helping our region build the capacity to compete.

• Seeking timely, fair recovery of investments made to improve service
  As utilities seek to recover the costs of much-needed investments—to update and modernize the grid, enhance reliability and replace aging generation infrastructure—upward pressure will be placed on rates. Ameren is committed to seeking constructive regulatory frameworks that encourage these important investments.
SUMMARY: AMEREN’S POINT OF VIEW

The detailed descriptions of our 20-year Point of View related to each topic are included in subsequent chapters of this report. Overall key views from each of the topics are shown here.

---

**THE ECONOMY**

Economic growth in our region likely will be less than national economic growth.

Meanwhile, long-term electricity demand in the U.S. Eastern Interconnection (the major power grid that serves the Eastern and Central states) is expected to grow at a slower rate than has been historically observed.

---

**TECHNOLOGY**

Game-changing technologies may impact our business—some as challenges, some as opportunities, some as both.

There are five areas of game-changing technology of critical importance to Ameren:

1. Natural gas (shale gas and methane hydrates)
2. Small modular nuclear reactors
3. Distributed generation and energy storage systems
4. Nontraditional energy systems
5. Advanced computing, as well as automation of grid operations and advanced analytics

---

**CLIMATE & ENVIRONMENTAL POLICY**

Environmentalism as a public sentiment likely will increase throughout the planning time frame, especially as the economy recovers from the recession.

Existing environmental regulations and those in the pipeline will have the most direct impact on coal-fired generation.

All coal-fired power plants not “well controlled” from an environmental perspective probably will be retired within 20 years.

---

**FUTURE OF COAL**

Coal will continue to represent a significant portion of the U.S. capacity mix, but roughly 20% of existing coal-fired generation likely will be retired within 20 years.

There are 7 gigawatts’ worth of new coal plants presently in the permitting and/or construction stages, but not all of these will be completed.

---

**NATURAL GAS**

Natural gas will be among the preferred energy choices for domestic power generation and industrial use—competing with existing coal, renewables, and new nuclear for a growing share of generation capacity.

Supply will be robust over the long term. Gas prices likely will remain stable in the near term, and any future price increases will be moderate—even with tighter regulations related to well casings and hydraulic fracturing.
SUMMARY: AMEREN’S POINT OF VIEW (CONT.)

The detailed descriptions of our 20-year Point of View related to each topic are included in subsequent chapters of this report. Overall key views from each of the topics are shown here.

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<td>Power prices will remain depressed for the next five years and may tend to rise over time, as coal-fired generation is retired and replacement capacity is installed. Wholesale energy prices will remain relatively low for the long term.</td>
<td>Nuclear is a carbon-free resource with the potential to replace retiring coal units in the future. Small modular nuclear reactor technology will be the favored choice for future nuclear units. Several of these units likely will be developed within the next 20 years. The Callaway Nuclear Energy Center would be a good location for multiple units, viewed from a plant-siting perspective.</td>
<td>Rooftop solar installations will be cost competitive throughout the nation by 2030 based on market economics—not on government subsidies. Utility-scale renewable projects will face a competitive disadvantage due to low natural gas prices and the absence of a national clean energy standard.</td>
<td>An order by the Federal Energy Regulatory Commission (Order 1000) will induce more competition for transmission expansion. Future transmission expansion opportunities likely will be tied more to addressing reliability and congestion issues than to supporting wind generation.</td>
<td>While customer expectations will evolve, reliability and price will continue to be the dominant issues over the long term. Customers will be increasingly receptive to new energy technologies and third-party products and services.</td>
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ABOUT SCENARIO DEVELOPMENT

Ameren’s vision is “Leading the way to a secure energy future.” To do that, we need to examine different ways the future might unfold.

That’s why we develop several plausible-yet-provocative future outcomes, or “scenarios.” Each one presents us with distinct conditions—whether fiscal, political, industrial or technological—that cause us to contemplate which strategies and responses might be necessary in order for our business to be successful.

In performing this thought exercise, our chief intent is to challenge our strategic assumptions and biases. Pressure testing our “Point of View 2012” against hypothetical scenarios prompts us to build flexibility into our corporate strategy … with a view toward long-term value creation, sustainable earnings growth and top-tier total shareholder returns. This exercise also is valuable in identifying ongoing signposts to monitor.

SCENARIO ANALYSIS

Our 10 planning topics were extensively vetted against the assumptions and macroeconomic modeling results of four scenarios*. These were constructed with a wide range of potential driver outcomes, so we could gain robust perspectives across the 10 topics. The primary purpose of this exercise was to enhance our understanding of the potential impacts to our viewpoints when key drivers of our business change—providing deeper insights to inform Ameren corporate strategy.

*We enhanced the 2012 scenario descriptions by providing wider ranges of driver outcomes of some topic areas, and considered more diverse regulatory and governmental ideology and policy constructs.
THE FOUR SCENARIOS WE EXAMINED ARE BROADLY CHARACTERIZED AS:

GRID.COM

Description:
Among other factors—e.g., promulgation of a federal clean energy standard and modest energy prices—this scenario contemplates rapid innovation in energy efficiency and distributed generation technologies. In particular, solar photovoltaics (PV) for both utility and distributed generation continue on their recent price path—reaching about 50 cents per-watt installed by 2030. This makes solar a transformational technology, causing brisk customer adoption and significant dislocation of utility demand. Energy efficiency and smart grid technologies cause the power demand growth rate to fall below zero.

Why we examined it:
Grid.com highlights the fact that we must begin thinking differently about our customers and our business. The capabilities, processes, tools and systems required to be successful in an environment in which technological advancement contributes to declining demand must be considered—starting today.

Impacts:
In this type of scenario, customers would benefit from advances in technology that provide them with options to significantly reduce their electricity use, self-generate and become less reliant on their utility supplier for reliability. Although the economy grows under Grid.com, the traditional, regulated utility model—with central station generation—would be put under tremendous stress.

Replacing retiring coal-fired power plants with some utility-scale solar and natural gas combined cycle plants would create more localized needs for investment in transmission. (This suggests that decoupling electricity rates and packaging new products and services for customers would be needed, along with potential investment in utility-owned distributed generation and natural gas delivery infrastructure.)

DEPRESSION 2.0

Description:
This bleak scenario explores the effects of a prolonged downturn, with negative-to-flat U.S. economic growth for 15 years—along with modest natural gas prices, declining demand for electricity, a modest federal clean energy standard and significant inflationary pressure on commodity prices.

Why we examined it:
Depression 2.0 highlights the fact that we must be mindful of the fragility and uncertainty surrounding our current economic recovery, as well as unprecedented levels of government debt and deficit spending, which must somehow be addressed in years to come.

Impacts:
Essentially, there are no “winners” in Depression 2.0. Electric demand would decline as customers retrench in response to high inflation, high interest rates and unemployment. These factors also would create a very challenging investment climate for utilities, leading to very little infrastructure development and asset replacement.

Since existing assets would need to be maintained as long as possible, Ameren would face the very pressing challenge of how to maintain our energy centers and infrastructure for extended operation. Regulators might feel increasing pressure to control rates and choose not to pass on legitimate utility expenses. This conceivably could have the negative effect of degrading system reliability.

In a prolonged downturn, debt service would consume a larger share of the federal government. Regulatory bodies might virtually grind to a halt—possibly eliminating the chance of carbon restrictions or of a national Renewable Portfolio Standard or clean energy standard. The government’s ability to subsidize any technology development also would be undercut.
BIG GOVERNMENT

Description:
This scenario considers extensive regulatory and legislative changes at the federal level—and the impacts of these on the marketplace. It contemplates what might happen if a major climate event (or series of events) were to occur, causing a global consensus to form around curtailing carbon dioxide (CO₂) emissions from fossil fuel consumption. It sees a strict federal clean energy standard being enacted, as well as restrictions on “fracking” for natural gas. Also in this scenario, the economy would continue to recover at an anemic but consistent level of growth.

Why we examined it:
Big Government highlights the tremendous impact that evolving greenhouse gas policies can have on our business. We must evaluate all decisions with long-term consequences in light of these uncertainties.

Impacts:
With the government assuming a “command and control” posture to drastically reduce carbon emissions, policymakers would choose non-carbon technologies for the marketplace. Among these may be nuclear, which could see massive gains, along with energy efficiency and renewable resources.

The largest challenge facing Ameren in this scenario would be the prospect of retiring portions of our coal fleet early, given that carbon capture and storage retrofits for existing plants likely will not become economical during the Point of View time frame.

However, Big Government overall favors utility investment, including in nuclear generation and transmission. Creation of a federal clean energy standard (at 80 percent) and a ban on “fracking” would create the need to connect new nuclear and renewable generation. While load growth would be low by historic standards, regulators may be more inclined to grant rate adjustments to cover investment in nuclear and transmission because of the regulations imposed on utilities.

HYDROCARBON BOOM

Description:
This scenario contemplates continued, significant improvement of the technologies behind the boom in natural gas extraction from shale formations, as well as improvements in liquid and oil shale extraction. These advancements result in low-cost, abundant dry gas, gas liquid and crude oil—causing the U.S. economy to reindustrialize. Regulations are set such that extraction and industrialization are done in a clean, safe and water-sustainable manner, and motivation to regulate carbon is dampened by the economic boom.

Why we examined it:
In the 1990s and 2000s, whole industries left North America in search of cheaper hydrocarbon production factors; this scenario explores a more energy independent nation that supports their return. The central challenge, then, would be finding ways to keep up with the development arising from the extraction and industrial boom.

Impacts:
This is the most favorable scenario for utility growth. Utilities would see significant increases in electric demand, driven by a reindustrialized economy. It envisions petrochemical, fertilizer and other heavy industries returning to domestic operation and driving significantly higher economic growth. With little or no emphasis on limiting carbon emissions, utilities would be able to meet demand increases through existing coal-fired and new gas-fired generation. Under this scenario, however, new nuclear generation might be unlikely due to the favorable outlook for hydrocarbon-based resources.

Huge investments would be needed to support the processing, transportation, storage, marketing and delivery of energy. Hydrocarbon Boom suggests that utility earnings growth likely would come from investment in new natural gas generation assets, transmission, midstream infrastructure and delivery systems.
Having analyzed the impact of the various scenarios on each of the 10 planning topics, seven* drivers emerged as the key factors with the greatest influence on our business today—and for the foreseeable future.

In order to track changing conditions related to these drivers, we developed a unified set of signposts to monitor. Our signposts can provide us with advanced signals indicating that we may be heading away from our base case assumptions and toward one of the four scenarios; we may then choose to alter our strategy.

*Drivers are the factors that "drive" change; signposts are the metrics and developments we use to monitor drivers. Below are the seven key drivers and corresponding signposts.

<table>
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<th>DRIVER</th>
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| Capital markets and desired investment returns | • Yields on U.S. Treasuries  
• Utility peer group total shareholder return performance  
• Dividend tax policy                                                                 |
| Economic growth                             | • National Gross Domestic Product (GDP) growth rate  
• Regional GDP  
• Regional employment  
• Regional population growth                                                                 |
| Environmental regulations                   | • U.S. Environmental Protection Agency (EPA) action on greenhouse gas emissions for new and/or existing power plants  
• Environmental sentiment and regulations  
• New legislation introduced in federal or state legislative proceedings  
• Actions at the state level—either expanding or relaxing Renewable Portfolio Standards—or a federally created clean energy standard  
• EPA action related to natural gas drilling and hydraulic fracturing |
| Government ideology and policy              | • Continuation (or not) of tax credits or other incentives for clean generation  
• Funding of technology advancements related to nuclear, carbon capture and sequestration, renewables and storage |
| Natural gas prices                          | • Projects to repurpose existing interstate pipelines to deliver shale gas to Midwest markets  
• Construction of new pipelines and laterals  
• Price levels—short-term and long-term contracts |
| Reliability                                 | • Multi-Value Project needs (transmission)  
• Customer perceptions of reliability, including complaints received by state regulatory commissions |
| Technology advancement                      | • Results from programs funded by the U.S. Department of Energy  
• Early stage technology activity  
• Technology applications in the marketplace, particularly in overseas markets  
• Venture capital and private equity investment levels |

*In our analysis, we found some common drivers and further stratified these as either primary or secondary drivers. From this list, we settled on seven. These seven alone do not paint a complete picture of an unfolding scenario; each is driven by many factors.
Despite several significant factors (the U.S. recession of 2008-09, domestic and international budget challenges and the worldwide economic impact of the tsunami in Japan), most economists expect that during our Point of View forecast period, growth in the U.S. economy will return to levels approaching the recent trend of the past few decades.

Still, a number of significant risks—from domestic policy challenges to international developments—could take the economy on markedly different courses.

After the U.S. entered into World War II, the domestic economy grew for several decades at an average annual rate of 3.3 percent. By contrast, the more recent trend of economic growth—spanning 1970-2010—saw an average annual growth rate of 2.8 percent. Most economists now expect the near-term growth rate to exceed that trend line for a few years, but then return to or fall slightly below it over the next 20 years.

Historically, economic growth has been accompanied by attendant increases in energy demand—specifically, electricity. While this general fundamental relationship clearly still exists, it has weakened considerably in recent years as the U.S. economy has become more energy efficient.
Ameren’s Point of View on the national economy is that it will grow consistent with the low end of the range of available projections by economists—between about 2 percent and 2.5 percent for the remainder of the forecast period. We reviewed multiple projections and considered the significant headwinds still faced by the U.S. economy in the aftermath of the financial crisis.

Since the recession, GDP growth has continually lagged what economists and government agencies had anticipated a year or more earlier. For example, the chart “U.S. GDP Growth: Downward Revisions as Growth is Slow to Emerge” shows revisions to Macroeconomic Advisers’ forecast of GDP growth for 2011 and 2012, by comparing their forecast issued in September 2010 with one issued in September 2011. Other forecasters have made similar adjustments, postponing higher growth to later years.

The recovery is expected to continue to gain traction, producing GDP growth rates of between 2.8 percent and 3.2 percent through 2017. This view results from analysis of forecasts from various economists and U.S. governmental entities, which variously expect domestic GDP growth reaching up to, or over, 4 percent sometime during these years—and multiple years well above 3 percent, as shown in the “U.S. GDP Growth” chart.

We do not expect significant concerns over inflation during the forecast horizon. Through late 2014, slack in labor markets and manufacturing capacity utilization will keep inflationary pressures in check.

This will allow the Federal Reserve time to unwind its monetary stimulus during the following 24 months, at which point the Fed will use its monetary tools to continue to target a 2 percent annual inflation rate.

Long-term electricity demand in the U.S. Eastern Interconnection is expected to grow at a slower rate than has been historically observed. This decline is partly driven by our view of slow overall economic growth relative to history—and by our observation that economic growth has steadily become less energy intensive. We expect that trend to continue or even accelerate over the next 20 years, holding long-term growth rates well below previous trends.
REGIONAL ECONOMY
From a regional perspective, the economy of Ameren’s primary service territory—eastern Missouri and central and southern Illinois—has grown more slowly than the national economy for the past couple of decades.

Our view is that this trend likely will continue for the long term. According to U.S. Census Bureau data, St. Louis is among the large metropolitan areas with sustained negative net migration. This causes the St. Louis area to lag other metros in population growth. Long-run economic activity is driven by labor force growth and productivity, so declining demographics (relative to the nation) suggest continued slower growth in Ameren’s service territory.

Although investment opportunities may be somewhat limited by slow growth, significant investments still may be necessary in order to comply with environmental regulations and to address aging infrastructure—so we can maintain quality service in Illinois and Missouri.

INDUSTRY BACKDROP
The performance of global, national, regional and local economies is important to virtually all business enterprises. This certainly is the case for energy/utility companies generally—and Ameren specifically. Economic growth is an important driver of demand growth, which requires investment in new electric generation and gas and electric transmission and distribution facilities.

But while economic growth will always have implications for energy demand and pursuant investment needs, the historical model that has persisted for decades may have weakened in a significant way for energy companies.

*To understand why, consider the chart below. It compares U.S. GDP growth with both total national energy demand and electricity demand (all series indexed to 1 in 1973).*

Since the early to mid-1990s, electricity growth has lagged GDP growth. Our view is that this trend will continue.
From 1949 through the early 1970s, total energy demand and GDP grew at nearly identical paces (orange line versus blue line). Beginning sometime around the 1973 oil embargo, economic growth appears to have become less energy intensive. This may well have been a response to energy price and national security concerns from that era, but the trend has continued unabated ever since.

One way the economy became more energy efficient is through electrification. It’s apparent that, from the mid-1970s through the early 1990s, total electric demand grew at an equivalent rate to the economy at large, while total energy demand growth lagged.

Since the early to mid-1990s, electricity growth has lagged GDP growth, as well. At this point, much of the electrification that was driving overall energy efficiency had taken place. Many of the end uses that were driving rapid residential and commercial load growth—such as air conditioning—began reaching a natural point of saturation. This helped make electric demand growth start lagging economic growth.

Other contributing factors include federal efficiency standards on many end-use applications, as well as state building codes and utility-sponsored energy efficiency and demand-side management programs.

Ameren’s Point of View is that this trend will continue, and electric demand growth likely will be slower than overall economic growth going forward.

The broader economy will retain significant influence on our industry—including the ways that utilities finance and recover investment costs. Economic conditions will influence utilities’ ability to access capital markets on reasonable terms and to get constructive regulatory treatment to recover investments.

The types of investments and regulatory solutions that Ameren considers must be informed by expectations of economic realities, as these may influence our ability to finance much-needed investments and earn a reasonable return.
The purpose of this section is to examine several technologies as “game changers”—those with the potential to transform traditional electric and gas utility business models.

To be clear, transformative technological change must be disruptive at a “scale that matters” in order to impact business models.

Consider Ameren’s examination of a trio of distributed generation technologies (solar, energy storage systems and fuel cells). Taken alone, none of these technologies meets the criteria for “scale that matters.” Taken together, they may pose big challenges for a utility, as the cost of the technology bundle reaches grid parity.

In addition to reviewing technology innovators, we undertook many internal and external assessments and concluded there is no “transformational” technology expected in the marketplace in the near term. Nonetheless, there are technologies due to mature within the next 20 years which, when combined, likely will have a significant impact on our company.

Ameren needs to be prepared to adjust our business model—including our approach to central station generation—in order to continue creating value for our shareholders and customers within the context of these advancements.

THE GAME CHANGERS
The following technologies will enable improvements in the environmental performance, efficiency and effectiveness of energy production and use over the next 20 years:

Natural Gas Extraction
- Fracking and directional drilling
- Recovery of methane hydrates

Nuclear
- Small modular nuclear reactors

Distributed Generation
- Solar technologies
- Energy storage systems
- Fuel cells

Nontraditional Energy Systems
- Microgrids
- Net-zero energy buildings (self-supporting facilities)

Advanced Computing & Grid Automation
- Smart grid/analytics
- Automation

We assessed many other technologies in preparing our Point of View. While some of these showed promise, they did not reach the level of “game changer,” nor were they disruptive at a “scale that matters.” (For example, a few of these other technologies included advanced coal-fired generation, geothermal energy and electric vehicles.)
OUR POINT OF VIEW

NATURAL GAS EXTRACTION TECHNOLOGY

A revolution in shale gas extraction has been deemed a true “game changer” for the U.S. energy industry and the economy as a whole. This is because of the success of horizontal drilling and hydraulic fracturing (commonly referred to as “fracking”), coupled with advances in this technique.

Traditionally, gas wells were drilled vertically to access gas that seeped up and became trapped by an impermeable layer of cap rock. With horizontal drilling, a well is drilled vertically through permeable and impermeable layers, then turned and drilled horizontally. To enhance the flow from the tight shale formation, the producing area along the horizontal bore is hydraulically fractured by injecting high-pressure fluids.

This process has raised a number of environmental concerns, many involving aquifers and their potential contamination from drilling fluids associated with hydraulic fracturing. There have not been any reported cases in which an aquifer was breached because of the fracking process; the quantity of impacts to surface and groundwater resources is currently unknown because of technological uncertainties. The U.S. Environmental Protection Agency is studying the technique, with a final report expected in 2014. While more stringent standards and regulations are expected, it’s not anticipated that they will slow gas production growth.

Other innovative technologies within the natural gas arena include methane hydrate extraction (basically the same process, but gas is trapped in marine sediments). Gas is extracted by injecting carbon dioxide into the hydrates, where it is exchanged with the methane molecules locked up in ice. Methane hydrates offer enormous supply potential: The U.S. Department of Energy estimates this resource may contain as much as a quintillion cubic feet of natural gas.

(For more about natural gas, see Page 42.)

SHALE DEVELOPMENT

This is an example of horizontal drilling and hydraulic fracturing.

A well is drilled vertically through layers of rock, then turned horizontally. Fluids are then pumped at high pressure into the target shale formation, opening fractures that allow for enhanced production.

(Graphic representation based on American Petroleum Institute example of hydraulic fracturing for shale development. Used with permission of API.)
NUCLEAR TECHNOLOGY

Various reactors are in stages of research and development, including breeder reactors, high-temperature gas reactors and small modular reactors. Over the next 20 years, two types of technologies are considered options for future generation: large-scale, light-water reactor power plants and their smaller, modular cousins.

In recent years, small modular nuclear reactors (SMRs) have emerged as a new concept for electric generation in the utility industry. They offer base load, CO₂-free electricity at a lower absolute investment cost, as compared to large-scale nuclear reactors. SMRs are small in size (40-300 megawatts of generating capacity, compared to nearly 1,200 megawatts of net nuclear generating capacity at Ameren Missouri’s Callaway Energy Center). But SMRs combine many reactor system components into a single module.

“Unlike traditional reactors, SMRs can be assembled at a factory and shipped to a site as nearly complete units—resulting in lower capital costs and shorter construction schedules.”

Unlike traditional reactors, SMRs can be manufactured and assembled at a factory and shipped to a site as nearly complete units—potentially resulting in lower capital costs and much shorter construction schedules. SMRs also may allow greater flexibility through smaller, incremental additions to base load electrical generation: More SMRs can be added and linked together for additional electrical output, as needed.

While SMR technology in itself does not fit the definition of “game changing,” it does present a large opportunity for Ameren that could be disruptive at a “scale that matters” and impact our business model. For instance, Ameren Missouri’s estimated future cost of electricity for a variety of supply-side resources shows it as a promising generation option.

In 2012, Ameren Missouri announced our support for Westinghouse Electric Company’s application for federal SMR investment funds. We formed this partnership to position the state of Missouri for a transformational economic development opportunity: Becoming a global hub for the engineering design, development, manufacturing and construction of American-made SMR technology.

While SMRs remain a decade away from commercial deployment—assuming that design, licensing and development go as planned—and while they need to compete in the energy marketplace, we believe that SMRs are the future for nuclear, both domestically and globally.

(For more about nuclear energy, see Page 50.)
SOLAR TECHNOLOGIES

Solar technologies include photovoltaics (PV), which convert sunlight directly into electricity, and solar thermal technologies, which use the sun’s heat to generate steam for a turbine or heat engine.

Certain technologies have reached an acceptable level of maturity and already are making a strong showing in parts of the United States where policy drivers encourage and support investment in solar energy. For example, Concentrating Solar Power—a utility-scale generation technology that uses the sun as a heat source—has reached this level, but it’s more applicable to specific geographic areas, such as the desert Southwest.

Ameren is interested in advancing the development of solar energy to become a more cost-effective resource for utility or customer installations. In 2010, our company installed 100 kilowatts of various PV technologies at our St. Louis headquarters. This action reflected our strategy to meet Renewable Portfolio Standard requirements and our commitment to being an energy advisor for customers. At AmerenSolar.com, our customers can find first-hand information on how well these technologies are performing in our region.

As PV technologies become competitive with other supply technologies, Ameren could partner with our customers to provide an alternative source of energy and further diversify our revenue streams. Already, homeowners and business owners are installing more solar systems, and global demand for solar energy is expected to drive further cost reductions—ultimately providing pricing that’s more in line with U.S. retail power markets. As prices drop, solar energy resources will grow in the United States.

Data from various sources—the Solar Electric Power Association, National Renewable Energy Laboratory, U.S. Department of Energy (DOE) and Massachusetts Institute of Technology—coupled with our experience, suggest that solar PV installation costs will decrease dramatically over the next 20 or so years. The Energy Department’s February 2012 “SunShot Vision Study” has a goal of $1.50 per-watt installed cost by 2020, and DOE recently moved forward with a Funding Opportunity Announcement for “Plug-and-Play Photovoltaics” to develop the technology system necessary to achieve this goal.

(For more about renewable energy, see Page 54.)

SOLAR PV CELL

Photovoltaic (PV) cells are made of special materials called semiconductors, like silicon, that absorb the sun’s energy. When sunlight strikes the cell’s surface, it creates a current when the cell is connected to an electrical load. An inverter converts direct current into alternating current for consumer use.

(More information at AmerenSolar.com)
ENERGY STORAGE SYSTEMS

Energy storage systems—especially batteries—can serve a variety of applications along the entire electrical system: from generation support . . . to transmission and distribution support . . . to end-customer uses.

They can range from bulk power management technologies (offering hundreds of megawatts to gigawatts in capacity, with hours of discharge) to uninterruptible power supply management systems (offering kilowatts in capacity, with discharge power in seconds or minutes).

Energy storage adds the ability to deliver electricity when it is needed. Our company could realize large benefits in deploying energy storage technologies over the next decade—especially with enabling technologies, such as batteries.

Batteries are the technology with “game-changing” potential. They can be used as a source for power intermittency, and they provide a scalable technology for minutes-to-hours of power and energy (megawatts and megawatt-hours). Advancements in battery energy storage systems toward commercial adoption are expected to occur rapidly over the next five to 10 years. Looking forward, the ability to store energy will be critical to the utility industry’s ability to respond to:

- **Significant expansion of intermittent renewable generating sources.** Renewables development is the most immediate driver, because the ability to store energy would help mitigate associated system problems—namely, the intermittency of wind and solar power. Also, wind generation technologies have their peak output when the system is at a time of low demand, creating an opportunity for capturing unused electricity. Improvements in small-scale batteries will enable solar PV as a more viable distributed generation technology for utilities and customers.

- **Greater use of electric vehicles.** The popularity of hybrid, plug-in hybrid and fully electric vehicles is another factor in energy storage development. Improvements in battery technology for vehicles may potentially lower the cost and extend the range of plug-in vehicles. Over the next decade, the existing electrical distribution infrastructure will be sufficient to handle the impact of electric vehicle charging.

WHAT ABOUT PLUG-IN VEHICLES?

Plug-in vehicles were not included as a “game-changing” technology in this report because the adoption rate of electric cars depends a lot on consumer preferences, as well as another technology: batteries. (A breakthrough in battery technology may result in significant cost reductions for electric vehicles.) But our customers have questions about electric cars, and we want to help answer them. That’s why our online Energy Advisor includes useful tools and resources on a variety of energy-related topics, including electric vehicles. Customers can learn how they work, explore available rebates and incentives, and even request a free “plug-in” readiness assessment of their home or business.

Other tech topics include customer generation, smart grid, solar power—and much more. Visit AmerenMissouri.com/energyadvisor.
FUEL CELLS

Fuel cells generate electricity through a direct electrochemical reaction known as “reverse electrolysis.” This reaction allows for higher fuel-to-power conversion efficiencies than mechanical systems. (There are different types of fuel cells, including solid oxide and proton exchange membrane fuel cells.)

Fuel cells are ideal technologies for small, distributed power generation. They are highly efficient, and they have low air/noise emissions and limited moving parts. Meanwhile, waste heat can be effectively used for commercial building heating and cooling.

While burdened by high cost and questionable durability today, fuel cells are a potentially disruptive technology being developed to satisfy an array of energy needs—from residential, commercial and industrial power generation and heating … to products, such as automobiles, laptops and cellphones.

When fuel cells become more cost effective, customers may turn to self-generation to better manage their energy bills. Large-scale deployment and adoption of distributed fuel cells may eventually compete with the current central station utility business model. Fuel cells also could provide choice for end-users—offering affordable power, increased reliability and lower emissions.

If and when fuel cells become competitive with other supply technologies, Ameren could partner with our customers (as we could with solar PV) to provide an alternative source of energy and further diversify our revenue streams.
MICROGRIDS
The microgrid is an emerging “smart grid” concept—basically, a small-scale version of a centralized, utility-scale electric system.

Microgrids generate, store, distribute and regulate the flow of electricity to customers, but do so on a local level—such as a neighborhood, office park, university, military base or other small-scale entity. This provides a community the choice of electricity generation sources and supplies, such as locally distributed renewable energy sources. Microgrids also interface with the larger, utility-scale grid.

Over the next several years, Ameren expects emerging technologies to not only improve grid automation and monitoring techniques, but also to facilitate the expansion of nontraditional energy systems. Microgrids will progress further into the deployment and maturation stages within the next decade.

At the utility level, then, the distribution system must be designed and protected in a manner that will accommodate microgrids as they emerge and interact with the larger grid.

NET-ZERO ENERGY BUILDINGS
Traditional buildings consume 40 percent of the total fossil energy in the United States and Europe. Meanwhile, “net-zero” describes a building with “0” net energy consumption from the electric grid on an annual basis. The net-zero energy principle is gaining considerable interest—whether to reduce fossil fuel consumption, greenhouse gas emissions or overall energy cost.

“The net-zero energy principle is gaining considerable interest—whether to reduce fossil fuel consumption, greenhouse gas emissions or overall energy cost.”

Advanced construction materials—like phase-change wallboard materials, improved insulation materials and improved air sealing techniques—and thermal envelope design can help provide a buffer to minimize heating, ventilation, and air conditioning (HVAC) loads. Less electricity is required to maintain the same comfort level. This, in turn, reduces the cost of all of the other systems within the building—both the HVAC system and electricity sources, such as on-site renewables or energy storage systems—to meet the load needs.

Development of energy management control systems with integrated occupancy, temperature and lighting sensors can allow for highly efficient control of comfort systems without affecting building occupants. We expect these key technologies for net-zero energy buildings to be fully developed before 2020.
ADVANCED COMPUTING & GRID AUTOMATION

The term “smart grid” was coined by the U.S. Department of Energy. It represents the infusion of technology—communications, automation and end-device intelligence—into the electric grid to improve reliability and provide new capabilities for customers. With these goals in mind, Ameren has been making “smart grid”-type improvements to our system for years in both Illinois and Missouri.

In our Point of View, a smart grid provides:

• Systems integration
• Data collection and analytics
• Automation
• Use of distributed generation, storage and energy efficiency technologies
• Customer benefits

Over the next several years, we expect emerging technologies not only to improve grid automation and monitoring techniques, but also to facilitate the expansion and development of renewable energy, plug-in electric vehicles and customer home energy management systems.

Much of the demand for smart grid technologies will be driven by regulatory and legislative policies that offer incentives, mandate installation or simply provide cost recovery for the investment.

Since the speed of adoption of many such technologies greatly depends upon developing appropriate regulatory constructs, we need to monitor such items as customer subsidies for solar and wind integration. Ameren believes that regardless of the regulatory framework, smart technologies will offer our customers greater control over their energy usage and costs.

With the right customer and utility incentives, advanced metering and automated grid infrastructure also could enable more active consumer participation in “demand response.” That is, technology could enable customers to make energy-use decisions—whether manually or through “set it and forget it” automation—based on detailed information provided by the utility and supported by real-time energy pricing.

And, as with microgrids, Ameren fully expects to continue pursuing technology paths that have been laid out by decades of experience—such as SCADA, outage management, distribution automation and other systems—and that can be implemented in tandem with our existing infrastructure replacement and life-extension strategies. We will closely monitor analytics as smart grid technology progresses within the next decade. We also should monitor enhanced voltage control efforts, which reduce energy loss.
The electric utility industry is subject to multiple environmental laws and regulations. Many of these—the Clean Air Act, the Clean Water Act and others—require a process for periodic updating of their respective environmental regulations based on the latest peer-reviewed environmental science and public health information. Continual updates to these regulations present both challenges and opportunities to Ameren.

The table on the adjacent page illustrates some of the major regulatory challenges—from air quality to water to combustion by-products—facing the industry and Ameren over the next five to 15 years.

Moreover, the U.S. Senate is considering legislation that would create a national clean energy standard. It would require 84 percent of energy to be produced from “clean” resources—such as wind, solar, small modular nuclear reactors or combined cycle combustion turbines—by 2035. Although this currently is highly speculative, it’s an important potential outcome to consider. If enacted, it would significantly impact the makeup of electrical supply resources in the U.S. over the next 20 years.

Notably, public perception of environmental issues is changing. With public education curriculum including more content around such topics as climate change, sustainability and people’s impact on the planet, a greater percentage of the U.S. population today believes that corporations should do more to improve environmental performance, regardless of cost.

At Ameren, the scope of our environmental responsibilities includes:

- Coal, nuclear, gas and hydro generating facilities
- Transmission line siting and maintenance
- Property assessments and remediation
- Transportation fuels
- Chemical usage and storage

With this in mind, concepts and viewpoints discussed in this section generally will apply to all of these applications. But because many environmental laws and regulations are aimed at coal-fired power plants, our discussion will focus on the environmental mandates associated with electrical generation and, to a large degree, our coal-fired energy centers. Coal currently represents 85 percent of Ameren's electric generating mix.
## ENVIRONMENTAL REGULATORY CHALLENGES: 2012 & BEYOND

<table>
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<tr>
<th>AIR</th>
<th>CLIMATE</th>
<th>WATER</th>
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<td><strong>Mercury and Air Toxics Standards (MATS)</strong></td>
<td><strong>New Source Performance Standards (NSPS), new and modified sources</strong></td>
<td><strong>Clean Water Act, 316(a) and 316(b)</strong></td>
<td><strong>Transmission siting and permitting</strong></td>
<td><strong>Coal Ash</strong></td>
</tr>
<tr>
<td>Also referred to as Utility Maximum Achievable Control Technology (MACT). Aimed at reducing mercury, particulate matter, acid gases and organic compounds from coal and oil-fired power plants. Requires retrofits to existing plants.</td>
<td>Places limits on greenhouse gas emissions, such as carbon dioxide, for new coal-fired generation plants.</td>
<td>Section 316(a) applies to temperature limitations imposed on cooling water discharges from electric generating stations. Section 316(b) requires the determination of whether the withdrawal of cooling water causes or has the potential to cause adverse environmental impacts on aquatic populations and communities.</td>
<td>Requires approval from multiple state and federal agencies to build or upgrade transmission facilities.</td>
<td>Oversees the handling and disposal of coal combustion by-products, such as “fly” ash.</td>
</tr>
<tr>
<td><strong>Clean Air Interstate Rule (CAIR)</strong></td>
<td><strong>NSPS, existing sources</strong></td>
<td><strong>Effluent Guidelines Limitations</strong></td>
<td><strong>Avian Protection</strong></td>
<td><strong>Polychlorinated Biphenyls (PCBs) in Electrical Equipment</strong></td>
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<tr>
<td>Targets air transport of sulfur dioxide and nitrogen oxide emissions from power plants in the eastern half of the United States.</td>
<td>Regulates greenhouse gas emissions from existing generating facilities.</td>
<td>Requires treatment of wastewater discharges from electric generation plants.</td>
<td>Aimed at reducing dangers posed to birds from power lines and other electric infrastructure.</td>
<td>Applies to manmade organic chemicals no longer commercially produced in the U.S., but may be present in pre-1979 materials, such as transformers, capacitors and switches.</td>
</tr>
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<td><strong>Regional Haze/Visibility</strong></td>
<td><strong>Best Available Control Technology (BACT) Permitting</strong></td>
<td><strong>Waters of the United States</strong></td>
<td><strong>Endangered Species Act</strong></td>
<td><strong>HazMat Transport</strong></td>
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<td>Rules and guidelines that apply to facilities emitting air pollutants (such as fine particulate matter, sulfates and nitrates) that impair visibility.</td>
<td>Requires that best available pollution control technology be applied to certain facilities, such as power plants, when making major modifications.</td>
<td>Regulations for permits and water quality in waters defined by the Clean Water Act (rivers, lakes, streams, wetlands, etc.).</td>
<td>Requires protection of endangered species during the construction and operation of utility facilities, such as power plants and transmission lines.</td>
<td>Regulates transportation of various hazardous materials involved in the generation and distribution of energy.</td>
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<td><strong>Multiple National Ambient Air Quality Standards (NAAQS)</strong></td>
<td><strong>International Negotiations</strong></td>
<td><strong>National Pollutant Discharge Elimination System (NPDES) permits</strong></td>
<td><strong>Vegetation Management</strong></td>
<td><strong>Electromagnetic Fields (EMF)</strong></td>
</tr>
<tr>
<td>Regulates ground level of air pollutants, such as ozone, particulate matter, sulfur dioxide, nitrogen dioxide, lead and carbon monoxide.</td>
<td>Refers to ongoing global negotiations related to climate change agreements and protocols, such as Kyoto and Copenhagen.</td>
<td>Applies to point source water and wastewater discharges to waters of the United States.</td>
<td>Applies to practices (such as herbicides) used to control tree/plant growth around lines to prevent outages.</td>
<td>Refers to invisible lines of force that surround electrical devices.</td>
</tr>
<tr>
<td><strong>New Source Review (NSR)</strong></td>
<td><strong>Waterbody-Specific Standards</strong></td>
<td><strong>Endangered Species Act</strong></td>
<td><strong>Best Available Control Technology (BACT) Permitting</strong></td>
<td><strong>Waters of the United States</strong></td>
</tr>
<tr>
<td>Requires electric utilities to go through preconstruction review for environmental controls if the utilities propose to build new generating units or make major modifications to existing units.</td>
<td>Unique standards applied on a waterbody-specific basis (rivers, lakes, streams, etc.) to prevent degradation from pollutants, such as mercury.</td>
<td>Requires that best available pollution control technology be applied to certain facilities, such as power plants, when making major modifications.</td>
<td>Waters of the United States regulations for permits and water quality in waters defined by the Clean Water Act (rivers, lakes, streams, wetlands, etc.).</td>
<td><strong>Endangered Species Act</strong></td>
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</table>
OUR POINT OF VIEW

The cycle of continual updates to environmental regulations with which Ameren must comply will present both major challenges and significant opportunities as we work to maintain our strong, proactive record of environmental compliance and stewardship.

Challenges stem from the costly environmental control technology required to comply with regulations. For example, legislative and regulatory mandates to control greenhouse gas (GHG) emissions would have a significant cost and operational impact.

Over the past decade, there have been several attempts to craft federal cap-and-trade legislation limiting GHG emissions. Although Congress has not seriously considered such a measure recently, several factors could bring the issue back into public debate. So the prospect of federal GHG legislation over the next two decades must continue to be examined.

Our view is that coal generation is the primary focus of potential GHG reduction requirements and, in the long run, natural gas-fueled generation also will be subject to future requirements.

Even without GHG legislation, the U.S. Environmental Protection Agency (EPA) has been active in the development of several environmental regulations aimed at reducing GHG emissions. EPA's latest proposed rule would establish standards requiring carbon capture and storage on any new coal-fired power plant.

For coal plants, compliance with such regulations requires installation of costly environmental control equipment. Since the cost of installing the necessary equipment on older, smaller power plants is prohibitive, regulations already have contributed to the announced retirement nationally of more than 30 gigawatts of coal plants over the next five to eight years. (Our merchant generation company, Ameren Energy Resources, decided to retire two energy centers in 2011, generating a total of about 0.5 GW.)

Retiring 30 gigawatts of U.S. coal-fired generation will permanently reduce annual CO₂ emissions by roughly 100 million metric tons. For perspective, that's the equivalent of taking about 18 million passenger vehicles off the road.
Meanwhile, opportunities lie in developing sustainable environmental solutions that meet public and shareholder expectations. In our view, Ameren’s innovative engineering bench strength and corporate commitment to environmental stewardship will help us meet future challenges. Ameren Missouri and Ameren Energy Resources generating companies are dedicated to solving existing and future environmental control problems.

Our efforts to gain expertise in solar, wind and methane gas energy are providing us with a strong foundation upon which to build our renewables portfolio. Prospects of additional nuclear and enhanced hydro generation—along with our efforts to seek regulatory frameworks that treat investments in energy efficiency and demand-side management programs equal to other important investments we make for customers—present a future in which Ameren can meet challenges, while delivering value to shareholders and customers alike.

We also look forward to partnering with the communities and customers we serve, to working with regulators and policymakers, and to educating our stakeholders about the “triple bottom line” of community betterment, environmental stewardship and financial strength.

Under the current view, construction of new coal-fired generation at Ameren would be severely limited. No new coal plants would be initiated during the planning time frame.

Nationally, only 7 gigawatts of new coal generation projects are presently far enough along in the permitting and/or construction process to be built (and not all of these will proceed or be completed). This is due to a number of factors, including:

• The low cost of natural gas.

• Recently proposed New Source Performance Standards for greenhouse emissions for new coal plants.

• EPA requirements aimed at reducing the level of hazardous air pollutants from new coal-fired power plants (Mercury and Air Toxics, or MATS regulation).

• Advances in technology (for generating electricity with natural gas and renewables, as well as technologies that help lower consumer demand for electricity).

“Opportunities lie in developing sustainable environmental solutions that reflect our company’s commitment to stewardship.”
THE FUTURE OF COAL
Coal will continue to fuel a major part of America’s electric generation, but will shrink from providing about 45 percent of generation in 2012 to about 38 percent in 2035 (Source: “Electricity Generation,” U.S. Energy Information Administration Annual Energy Outlook 2012).

Several factors are driving the decline in domestic coal utilization in power generation.

The most significant short-term factors are low natural gas prices coupled with robust supply—resulting in coal-to-gas switching. Technological advancements in horizontal drilling and hydraulic fracturing methods have resulted in an abundant supply of natural gas and low gas prices. Coal generation currently is being displaced with gas, especially in the Eastern and Southeastern United States.

“**The most significant short-term factors are low natural gas prices coupled with robust supply—resulting in coal-to-gas switching.**”

For the medium term (the next four to eight years), the most significant drivers are potential federal regulations regarding clean air, ash utilization and disposal, wastewater treatment and mercury and air toxics. As we discussed in the “Climate & Environmental Policy” topic area, stringent U.S. Environmental Protection Agency regulations are expected to drive coal plant retirements—particularly of older and smaller coal units—and to restrict or completely eliminate new coal construction in the future.

At our company, Ameren Energy Resources shuttered our Meredosia (203 MW coal-fired unit and 166 MW oil-fired unit) and Hutsonville (151 MW coal-fired generation) energy centers at the end of 2011, due in part to the expected costs associated with complying with EPA air pollutant rules.
OUR POINT OF VIEW

Our analysis indicates that up to 65 gigawatts of the existing 324 gigawatts of U.S. coal-fired generation will be retired in the next 20 years, and no new coal plant projects will be initiated. Meanwhile, only 7 gigawatts of new U.S. coal generation projects are presently far enough along in the permitting and/or construction process to be built (and not all of these will proceed or be completed). Over the long term, a significant portion of America’s coal fleet will be retired.

CONSUMPTION
As natural gas prices are expected to remain low into the future, further erosion of coal generation could take place. Utilities may opt to replace coal plants with gas plants and other cleaner energy generation sources, rather than retrofit emission controls on existing plants. Announced coal plant retirements of 30 gigawatts could reduce coal demand by an additional 110 million tons by 2018. These factors indicate a lower utility coal consumption level in the future, approaching the 700-million-ton level annually by 2018. Beyond 2018, the coal burn should remain stable or grow with electrical demand.

PRODUCTION AND PRICES
Moderate to no increases in coal prices are expected, and transportation prices likely will see limited increases over the long term. Coal pricing should trend toward total production cost as coal producers attempt to remain competitive with natural gas prices, with ample supply available in the market.

REGULATIONS
Because coal-fired power plants face uncertain federal regulations—including those regarding air quality, water and combustion by-products—Ameren Missouri and Ameren Energy Resources must continue to anticipate the impact of multiple regulations on our coal-fired generation facilities, and then remain flexible if they change.

For example, Ameren Missouri took an innovative approach to meeting expected new federal emissions rules. In July 2011, we entered into a long-term contract with Peabody Energy to purchase 91 million tons of ultra-low-sulfur coal—allowing us to defer significant environmental expenditures. We will be improving air quality at a dramatically lower cost to customers, who otherwise might have shouldered near-term electric rate increases of up to 20 percent.
NATURAL GAS
The shale gas revolution truly is a “game changer” for the American energy industry and the whole economy. The natural gas resource base in North America is immense and able to support projected demand growth at stable prices during Ameren’s 20-year Point of View planning period.

The primary drivers behind this phenomenal growth are technological breakthroughs made by producers in horizontal drilling and hydraulic reservoir fracturing—known as “fracking.”

(For more about advancements in gas production technology, see Page 23.)

In 2012, industry experts estimated that ultimately recoverable domestic natural gas reserves are roughly 3,300 trillion cubic feet (Tcf), compared with about 2,200 Tcf in 2000—enough to supply the United States for 145 years. The addition of shale resources also brings total global recoverable gas reserves to 22,600 Tcf, which represents over 225 years of worldwide demand.

As the supply sources for natural gas shift to emerging shale basins, the natural gas infrastructure will undergo a reconfiguration—from the traditional, long-haul interstate pipeline system to a more regionally focused system that connects new sources of shale gas to loads. With a build-out of gas-fired generation capacity, new lateral pipelines will be constructed.

In the Midwest, we’ll see a need for additional regional pipelines and storage to support gas-fired generation and industrial growth. The emerging production of the New Albany shale in southern Illinois may offer opportunities for Ameren to partner in the development of the required midstream assets.
OUR POINT OF VIEW

Ameren’s view is that natural gas will be one of the preferred energy choices for domestic power generation and industrial uses, and likely will see growing use in transportation over the next two decades. Gas used in generation could compete directly with coal, renewables and new nuclear for a growing share of capacity.

Our view is that gas supply will be robust over the long term, and that prices will remain in the moderate range through 2032. However, if gas producers maintain or improve efficiency gains for drilling and well completion at the rate experienced over the past three to four years, prices could stay in the low range throughout our planning period.

The stable prices are driven by vast reserves of shale gas and innovative drilling technologies. The natural gas market is very efficient, with producers reducing gas-drilling rigs in efforts to decrease supply. Increases in demand likely will cause short-term price fluctuations, but today’s producers are able to more efficiently and more rapidly increase production in response to price signals—as compared with the pre-shale gas environment. This enhanced ability should dampen long-term price volatility.

In the meantime, it’s important to consider that controversy surrounds the fracking process, largely due to concerns about potential contamination of drinking water aquifers from drilling fluids. Ameren expects tighter regulations on well casing specifications and fracking fluid composition. Also, while natural gas emits 50 percent less carbon than coal—and virtually no mercury or sulfur dioxide—it is possible that use of natural gas for power generation could be restricted in the future under more stringent carbon regulations. However, with the immensity of the resource base, currently we do not see production growth being significantly curtailed by future regulations.
POWER PRICES
There are two primary drivers of power prices: growth in demand for power, and the generation fuel mix. These drivers are functions of economic performance, regulatory policy and technological innovation.

From 2000 to 2010, increases in electricity demand averaged less than 1 percent per year in the United States. Ameren’s view is that long-term electricity demand in the U.S. Eastern Interconnection will grow at a slower rate than has been historically observed.

Regarding fuel mix, Ameren’s view is that over the next decade, generation resource additions and retirements will be driven by current and future federal environmental regulations, as well as by lower than historical natural gas prices.

State mandates and a general desire for cleaner energy sources are likely to assist in a transition from coal-based generation to other forms of generation. Should mandates drive greater renewable generation, a proportionate amount of dispatchable generation and/or energy storage will be necessary to balance the variability of renewable energy.

The recent economic downturn took a toll on power prices from 2009 to 2012, with prices well below those of a few years ago. The near-term outlook calls for prices to remain depressed through 2016. Further out, the outlook calls for prices to rise, as coal-fired generation resources are retired in response to additional environmental regulations.
OUR POINT OF VIEW

GROWTH IN DEMAND FOR POWER

Our Point of View is that annual electric demand will grow at a lower rate over the next 20 years than in years past, as a result of two primary factors:

• Environmental regulation:
  The increased cost of responding to current and future environmental regulation will be significant. Passing the increased cost of compliance or replacement generation on to consumers is expected to cause lower demand growth, as customers conserve in response to higher prices.

• Energy efficiency:
  Technological innovation in energy efficiency—and customer adoption of these programs—is occurring at such a pace that we believe it is having a significant impact on demand growth. As these energy efficiency technologies become more economical and penetrate a larger percentage of the market, demand growth will continue to slow.

FUEL MIX

There are two primary considerations related to the future fuel mix of the U.S. power market:

• Decline in coal-fired generating resources:
  Our view is that the development of new coal generation will stop and some coal plants currently permitted or under construction will not be completed. Due to the combination of a dramatically lower natural gas price outlook and the cost of environmental compliance, utilities will move toward development of natural gas-fired generation, primarily combined cycle plants. Other replacement generation resources likely will include renewables and, potentially, new small modular nuclear reactors. These generating resources cost much more on a total cost basis—including capital, operational and maintenance costs—than today’s fossil fuel sources. We expect those higher costs to be reflected in power prices; however, price increases may be capped because of the efficiencies of new combined cycle plants and the immense supply of natural gas.

• The move to cleaner energy resources:
  Current and future environmental regulation of coal-based generation in the power sector will invariably increase the price of power. This will occur either through direct compliance cost for existing coal-fueled plants, or through the retirement and replacement of existing resources with more expensive, less carbon-intensive generation resources.

  If the generation fleet is reconfigured from coal to cleaner resources, the high level of transmission investment required to integrate renewables would also raise utility customer costs. We expect that those higher retail prices would be reflected in wholesale power prices across the nation.

POWER PRICES

In light of these drivers, our view is that lower demand growth and sustained, relatively low natural gas prices in the future—along with a desire for cleaner forms of generation—will slowly increase wholesale energy prices over the long term. At these energy price levels, the capacity markets likely would need to further develop to provide an appropriate return on generation investments.
Nuclear power represents close to 14 percent of the electricity generated throughout the world, and global nuclear generation capacity is increasing steadily. At present, more than 60 reactors are under construction in 14 countries. Here in the United States, nuclear remains an important part of the mix, too—about 20 percent of the electricity generated domestically.

Still, the aggressive U.S. nuclear renaissance that was in progress a few years ago has been tempered by several factors—the March 2011 events at Fukushima, Japan, as well as historically low natural gas prices and loss of load growth due to poor economic conditions. Unless economic factors shift to their favor, many U.S. utilities currently seeking combined construction operating license applications for new, large units likely would not build these in the near term.

Existing U.S. plants are continuing to seek license extensions/renewals—extending their lifetime to 60 years—with consideration and research under way today looking at possibilities to extend even longer. Currently, 72 of the 104 operating U.S. nuclear plants have successfully undergone the license renewal process.

Ameren Missouri’s Callaway Energy Center has submitted for license renewal, and the Nuclear Regulatory Commission (NRC) review process is ongoing (scheduled for completion in December 2013).

Meanwhile, small modular nuclear reactors (SMRs) have gained considerable attention in the United States because of their ability to offer base load, CO₂-free electricity at a lower absolute investment cost, as compared to large-scale nuclear reactors. Recent funding support for SMRs by the U.S. Department of Energy (DOE) has spurred much interest in this design concept.

In March 2012, the DOE issued a Funding Opportunity Announcement to advance the development of American-made SMRs, calling this technology “an important element” of the president’s energy strategy. About $450 million was made available in cost-share funding to support “first-of-its-kind” engineering, design certification and NRC licensing for up to two SMR technologies. In April 2012, Ameren Missouri supported Westinghouse in its application for SMR investment funds, identifying this as a unique opportunity to help secure our state’s energy future. The agreement represented an unprecedented alliance of Missouri’s cooperative, municipal and investor-owned electric service providers.

ABOUT THIS TOPIC

Small modular nuclear reactors have gained considerable attention in the U.S., in part because of their ability to offer CO₂-free power.
We believe that small modular reactors will be the favored choice for future new nuclear units. With their smaller size, passive safety system and production efficiencies (unlike traditional reactors, SMRs would be assembled at a factory and shipped to a site as nearly complete units), SMRs offer lower capital costs and much shorter construction schedules.

Our partnership with Westinghouse reflects our commitment to addressing Missouri’s long-term energy needs. We believe nuclear power should continue to be preserved as a generation option, in light of aging infrastructure and significant environmental regulatory uncertainties.

SMR development could position Missouri for future economic development opportunities, as well. At present, SMRs remain a decade away from commercial deployment—assuming design, licensing and commercial development go as planned—and they will need to compete in the global energy marketplace. But the federal SMR program is encouraging American industry to compete by removing various barriers to reactor deployment and by accelerating development. The DOE anticipates that NRC design certification will result in a competitive advantage over designs being developed in other countries.

Ameren’s view is that, within 20 years, several SMRs will be developed across the nation. These could include those that Ameren Missouri and the state’s electric-service provider alliance may have constructed at our Callaway Nuclear Energy Center, which could be licensed for multiple units. Callaway would be a good location for multiple SMR units, from a plant-siting perspective.

Additionally, over the next two decades, it’s likely that SMR deployment will have been authorized for use at critical U.S. Department of Defense installations that require secure, long-term electrical energy supplies.

(For more information on SMR technology, see Page 24.)

Regarding large nuclear units, our view is that six to eight units will be built in the United States over the next 20 years. However, this view is contingent on the success of four units currently under construction in the Southeastern United States, as well as federal production tax credits available for new units commissioned for commercial operation by 2021.
ABOUT THIS TOPIC

Renewable resources are generally thought of as those that naturally replenish themselves, are not exhausted and are better for the environment. They include wind, solar, geothermal and biomass. Hydroelectric power is generally considered to be a form of renewable energy.

Ameren has a long history of incorporating renewable resources into our generation portfolio—starting a century ago with our Keokuk Energy Center, and most recently with our Maryland Heights Renewable Energy Center. This latest generation facility opened in summer 2012 and uses methane gas from a local landfill to efficiently produce enough power for 10,000 homes.

Currently, demand for renewable energy is largely driven by requirements for utilities in states with a Renewable Portfolio Standard (RPS). At this time, 29 states plus the District of Columbia have some type of compulsory RPS. Seven other states have non-binding goals.

(See map, “States with Renewable Portfolio Standards or Goals.”)

Absent such mandates—and/or incentives and subsidies—renewable energy resources would not be an economic generation choice for utilities in most regions of the country. High fixed capital costs make these resources marginal in value. (In the case of solar and wind, so do their intermittent, unpredictable output and low ratio of energy output to capacity rating.)

To incent construction of renewable resources, several mechanisms have been put in place, including:

- A production tax credit in excess of $21 per megawatt-hour (due to expire at the end of 2012)
- Accelerated depreciation for tax purposes
- Investment tax credits and Renewable Energy Credits

In addition, many public or regulated entities that must comply with various RPS programs are incented to enter into long-term contracts. This is often done on a cost-plus basis, giving potential developers certain revenue streams and the ability to secure financing.

Ameren’s Point of View with regard to large-scale renewable energy project growth is primarily based on such state RPS requirements. We also examined a build-out in transmission, advancements in technology, and energy storage capabilities in developing our view—which addresses distributed generation, as well.
OUR POINT OF VIEW

The adoption rate of renewable energy as a viable, long-term resource is expected to increase over the next 20 years, but will continue to be very regional in regards to depth of market penetration. Both wind and solar photovoltaics (PV) will be the primary sources for utility-scale generation from renewable energy sources.

Meanwhile, solar PV most likely will be the primary choice for residential and commercial generation. Within 20 years, we can see solar PV rooftop installations becoming cost competitive in Ameren’s service territories—thanks to technology advancements that improve performance and reduce costs. Our view is that adoption of renewables for distributed generation will increase over time.

At Ameren, we’re constantly looking for innovative ways to keep our commitment to renewable energy and to our customers. Our goal is to provide information, data and resources to help people make informed energy decisions. At the same time, we’re committed to seeking constructive, modern regulatory frameworks that enable us to partner with customers amid a shifting energy landscape.
TECHNOLOGY

Over the next 20 years, we believe that renewables penetration will increase as a result of improved efficiencies and lower costs of solar PV, wind and energy storage. This applies to both large, utility-scale wind and solar projects and to distributed generation.

- In order for renewables to have a meaningful impact on future utility generation supply, at scale, it will be critical to install energy storage or quick-start generation to manage the intermittency of wind and solar. Over the long term, the ability to store power in significant quantities when it’s generated (during lower-demand, off-peak hours) and deliver it later (during higher-demand, on-peak hours) will be key.

(For more on energy storage technology, see Page 26.)

- We expect technology advances to fuel growth in home and business solar PV. Again, this would be regionally based, depending on local electric rates and the installed cost of customer-scale generation and/or storage. Commercial customers have the greatest potential to economically increase their use of solar PV, in part due to certain tax and depreciation incentives. Significant developments may occur related to distributed solar PV such that erosion to central station generation could take place during our planning horizon. In Missouri, utility programs are limited to 5 percent of peak load, but customers in Missouri and Illinois would be able to increase adoption of PV or other smaller-scale generation in accordance with their needs and desires.

(For more on solar technology, see Page 25.)

RENEWABLE PORTFOLIO STANDARDS

Renewable Portfolio Standards most likely will remain at a state level. In some states, RPS will provide an opportunity for hydroelectricity to be included as a compliance resource. (This is the case in Missouri.) Although there is the potential for a federal clean energy standard—requiring that a certain amount of energy be produced from “clean resources,” including natural gas—we do not see a federal RPS being implemented. This is due to the lack of renewable resources in large sections of the country.

Currently, Missouri and Illinois each require increasing levels of electricity from renewables as a percentage of electricity sales, with Missouri requiring at least 15 percent beginning in 2021, and Illinois requiring 25 percent in 2026.

Longer term, our view is that market forces will drive renewables as policy drivers fade, as present state-level RPS requirements atrophy, and as no new national clean energy policy emerges. For new electricity generation capacity, renewables will be competing with coal, natural gas, distributed generation technologies (such as fuel cells) and, potentially, small modular nuclear reactors.

TRANSMISSION

The best U.S. wind resource is located from the Dakotas south to west Texas. In order to harness this resource and deliver the power to large population centers, a build-out in transmission is necessary. While our view is that future transmission expansion will be tied more to addressing reliability/congestion issues than to supporting wind generation, a push to add transmission capacity could nonetheless encourage development of new, large-scale wind projects.

Still, when it comes to wind development, Missouri can be expected to continue lagging behind Illinois, Iowa and Minnesota; these states have greater wind resources and greater capacity factors. Additionally, Missouri faces an electricity rate cap limitation in the state’s current RPS. Absent any additional legislative action, this cap limits the potential for wind development.
TRANSMISSION
Transmission lines carry high-voltage (100,000 volts and above) electricity over long distances—delivering energy from the generation source to substations, which then reduce the electricity to lower voltages so it can travel through the distribution system to homes and businesses. They form the backbone of our power grid.

New transmission lines are built so utilities can meet customers’ need for safe, reliable energy. Ameren is focused on expanding our robust transmission system of more than 7,400 circuit miles of high-voltage lines in Illinois and Missouri.

New transmission lines are built so utilities can meet customers’ need for safe, reliable energy.

Our effort in pursuing an initial group of transmission investments identified as “Multi-Value Projects” has succeeded in securing approval from the Midwest Independent Transmission System Operator, Inc. (MISO) for the Illinois Rivers, Mark Twain, Spoon River and other significant projects. In 2012, our company engaged in public forums and other important actions to initiate the Illinois Rivers project, which would build about 330 miles of lines from northeast Missouri to the Indiana border. (See map.)

Our Multi-Value Projects (MVPs) are part of a total $6.5 billion in new regional transmission investments approved by MISO in December 2011. In addition to other criteria, an MVP helps to address energy policy laws and/or provides widespread benefits across the region—including reliability, public policy advancement, and economic and job creation impacts.

Also, North American Electric Reliability Corporation (NERC) requirements associated with grid reinforcement continue to expand. Further, because of its benefits, we foresee expanding influence of regional planning and slow but steady progress in addressing cost-sharing issues. Ongoing operating and financing costs for existing transmission assets constitute a relatively small portion (e.g., 5 percent to 10 percent) of total utility costs. Within MISO and across the nation, significant system cost reductions can be created through improved generation dispatch and expanded transactions from economics-driven transmission investments.

We believe these and other factors will continue to drive growth in transmission investment nationwide. The key for Ameren is to execute swiftly, but carefully, to ensure our projects remain on track—not only to create expected investment returns, but also for the benefit of our customers.
OUR POINT OF VIEW

Looking ahead, Ameren expects that development of transmission projects regulated by the Federal Energy Regulatory Commission (FERC) will continue to offer growth opportunities. Depending on the pace of economic recovery, experts such as the American Society of Civil Engineers believe that extensive transmission investments are likely to be needed across the nation in coming years to avoid capacity shortages.

Even if federal stimulus diminishes, the total potential opportunity for Ameren—especially by pursuing projects outside our service territory—remains large because of the number of prospective projects already in motion. In addition to the $6.5 billion in projects formally approved by MISO, the independent system operator continues to carefully study about $30 billion of additional potential projects, through 2026.

At present, Ameren is executing on more than $1 billion of transmission investments in Illinois and $800 million in Missouri. These will enable us to continue to provide reliable service, respond to integration of renewable generation sources, improve efficiency, relieve congestion and provide flexibility to help address the challenges of increased environmental constraints.

Increasing our level of transmission investment allows Ameren to take a proactive approach to renewables development and environmental stewardship. Much of the national renewable energy growth is expected to originate from wind resources in Kansas, Oklahoma and Texas, or in Iowa and the Upper Midwest. Ameren’s service areas in Missouri and Illinois are likely thoroughfares for routing the wind power to eastern markets.

INCREASING COMPETITION

While Ameren increases our transmission investment, we are no longer assured of being the exclusive transmission provider in our service areas. On July 21, 2011, FERC issued Order 1000, which mandates that regional planning entities, such as MISO, develop procedures that enable competitors to incumbent utilities to develop projects identified in the regional planning process. New projects are likely to be subject to competition—starting possibly as early as 2014. This will present both challenges and opportunities to Ameren; potentially, new competitive opportunities could be pursued in partnership with other players.

THE ROLE OF RENEWABLES

Overall, future transmission expansion opportunities likely will be tied more to addressing reliability and congestion issues than to supporting wind generation.

Still, state-level Renewable Energy Portfolio Standards will continue to play a role in spurring transmission growth—especially as the economy recovers. This is expected to occur even if a national RPS or clean energy mandate doesn’t materialize. In the near term, new projects will be driven more by state-specific renewable energy goals and location-specific capacity needs, grid reinforcement, basis differentials and efficiency opportunities … and less by federal renewable energy policy.
CUSTOMER OF THE FUTURE
“Our residential, industrial and commercial customers expect their Illinois and Missouri utilities to provide safe, reliable and affordable energy … not just today, but long into the future.”
Ameren serves a combined 2.4 million electric customers and 900,000-plus natural gas customers in Illinois and Missouri. Our customers are at the heart of our business. Whether residential, industrial or commercial, our customers expect us to provide safe, reliable, affordable and environmentally responsible energy … not just today, but long into the future.

We recognize this because we regularly survey our customers and supplement these findings with insights from industry research. Time and again, customers in Illinois and Missouri tell us that energy price and reliability rank among their top priorities. This expectation will only grow over the next 20 years.

As new technologies and products emerge, tomorrow’s customers may come to perceive energy differently, too. For instance, as the electric vehicle market develops, customers may see electricity as something that not only powers their homes, but also their cars—as a clean, viable “fuel” for transportation. Such a trend would further reinforce the need for completely reliable power.

As customer expectations evolve, ongoing evaluation and optimization of all customer-facing processes, technology and communications will be critical to ensuring customer satisfaction. We must identify how to deliver value in these interactions, because the customer experience relates directly to value—and we’re committed to delivering value by delivering on our promise, Focused Energy. For Life.
OUR POINT OF VIEW

To prepare for any of the potential scenarios we have studied, Ameren must get closer to all types of customers: residential, commercial and industrial. By embracing a more robust view of market and customer segmentation, we can better understand our customers’ needs and the issues that matter most to them. Meanwhile, understanding their preferred communication channels and business transaction methods will be vitally important as we transition into the increasingly important role of a 21st-century energy provider.

This will enable Ameren to more effectively communicate about valuable products, tools and offerings, and to bolster our education and outreach efforts. For example, we want to help customers understand their service, the rate-making process and the need for constructive regulatory frameworks.

At the same time, our company should evaluate potential adoption of new, customer-related technologies. The greatest challenge to our current business model will emerge from such technologies and non-utility offerings.

UNDERSTANDING CUSTOMERS

During the next 20 years, Ameren will need an even deeper understanding of customer expectations in order to tailor and target programs for residents and for businesses, large and small. (For example, we know that existing residential segments include cost-conscious consumers who are focused on pursuing energy-saving opportunities; another segment pursues home improvement opportunities to increase property values. The latest energy-efficient technologies would be attractive to these customers.)

In our view:

- Customers who embrace technology will be interested in industry progress in advanced meters and smart grid—as well as consumer interfaces for these smart technologies.
- Utilities will need to offer alternative methods for interacting with customer technologies to enhance the overall customer experience.
- A growing number of customers embrace the green lifestyle. Residential consumers who are pursuing solar, wind and other distributed generation options—as well as hybrid, electric and alternative-powered vehicles—will be a segment of interest.
- We should monitor the trend of industrial and commercial businesses pursuing distributed generation, as this could impact the relationship between the regulated utility and its customers.
PRODUCTS & SERVICES
As utilities make much-needed infrastructure investments and seek to comply with environmental mandates and renewables standards, this will result in increased rates. Customers, then, likely will expect easy-to-implement programs that allow them to control costs by managing usage. With this in mind, a major differentiator among utilities will be the price and scope of products and services. This is a key change in the utility/customer relationship of the future—especially as a new generation establishes accounts with our company.

In particular, we should sharpen our focus on the needs of commercial and industrial customers. There are many value creation opportunities to explore in business-to-business processes and services. Doing so will require us to consider a range of programs and tariffs that address interest in different utility service offerings … while ensuring a respectable return on these investments for our shareholders.

Legislative and regulatory frameworks that allow utilities to receive timely cost recovery of, and financial incentives for, additional programs and services would allow our industry to partner with customers. One example of this is the Missouri Energy Efficiency Investment Act, which enabled Ameren Missouri in 2012 to announce the largest customer energy-savings program in state history. In Illinois, formula rates for electric delivery service have enabled plans to install advanced meters and offer associated pricing programs.

TECHNOLOGY & INFORMATION
Consumer technology is advancing at an incredibly rapid pace. Customers’ interactions with other companies’ advanced products and services will shape their expectations of utility offerings. As the business-to-consumer and business-to-business experience becomes more driven by digital technologies, customers will expect their utility to keep pace—increasing use of social media, offering mobile services and enhancing digital interactions. Ameren must be nimble in responding to these expectations.

Energy management partnerships will be an option for Ameren as we pursue the customer of the future. “Set it and forget it” technologies likely will advance, with potential opportunities available to ally with consumer product companies. Aligning electric vehicles with energy- and demand-management technologies will provide opportunities for value creation, as well.

As advancements in smart technologies and distributed generation occur—and as third parties vie to assist people in managing them—our customers likely will expect us to provide more information and develop associated programs. Again, a constructive regulatory environment will be critical in order to satisfy these customer expectations. Utilities must be able to offer such programs while earning a fair return on their investments.

ENVIRONMENTAL AWARENESS
Over the next 20 years, Ameren also must be prepared for customers’ increasing sensitivity to environmental issues. We believe that as the national and regional economies recover from the recession, our customers—and the public at large—will tend to view utilities through a lens of corporate responsibility and sustainability.

As customers become more sensitive to such issues as climate change, the environment and energy independence, the effect of energy use on the environment could garner greater attention. Increased consumer awareness would, in turn, drive demand for programs that help people better control energy use. This may be especially true as Generation Y continues to form households, and as Generation Z matures and establishes utility accounts. These younger generations are digitally savvy and likely will be more attuned to technology-driven energy management programs.
ABOUT AMEREN

Ameren provides the energy that’s vitally important to our economy and our way of living. That’s why *Focused Energy. For Life.* is the promise we make. Our company is committed to ensuring that the energy our customers need is there when they need it—now, and for life. Through strong shareholder returns, great customer service and giving back to our local communities, we work to build value for all.

- Ameren Corporation (NYSE: AEE) is a Fortune 500 company with assets of $23 billion.
- Ameren companies serve about 2.4 million electric and more than 900,000 natural gas customers over 64,000 square miles.
  - In Missouri, we operate primarily as a traditional, rate-regulated electric and natural gas utility with about 10,400 MW of generating capacity.
  - Our Illinois operations include rate-regulated electric and natural gas transmission and distribution businesses.
- Ameren’s merchant generation business includes several coal-fired energy centers and multiple natural gas-fired units, with about 5,500 MW of generating capacity.

![ELECTRICAL GENERATING CAPACITY](image)
Thank you for reading Ameren’s “Point of View 2012.” We hope this document has provided you with a better understanding of the energy industry, as well as areas of interest to you. More information about many of the topics covered in this report can be found at Ameren.com.

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**Advanced Metering Infrastructure (AMI)** — Systems that measure, collect and analyze energy usage. The infrastructure includes hardware, software, communications and consumer energy controllers that enable demand response solutions, products and services.

**Base load** — Power demand fluctuates on a day-to-day basis and on a seasonal basis. Base load refers to the minimum, or “base,” power load that utilities and grid operators must make available in order to meet the minimum level of demand. A base load power plant, then, is one that can generate consistent, reliable power to meet demand.

**Bcf (Billion cubic feet)** — This is a volume measurement of natural gas.

**Biomass** — A renewable energy source, biomass is biological material derived from living or recently living organisms, such as crop residues, wood, waste and alcohol fuels.

**Carbon capture and storage (CCS)** — CCS systems are being designed to capture carbon dioxide emissions from generating plants.

**Central station** — Most electricity is generated at relatively large, “central” power plants. This model emerged because it enabled efficiency and affordability through economies of scale.

**CO₂ (Carbon dioxide)** — This is a greenhouse gas produced by human activities, primarily through the combustion of fossil fuels.

**Combined cycle combustion** — This refers to electricity being generated from a gas turbine as well as from the use of the waste heat from the gas turbine. This waste heat is used to make steam to generate additional electricity.

**Concentrating solar power (CSP)** — Solar technology that uses lenses or mirrors to focus a large area of sunlight into a small area. Electrical power is produced when the concentrated light is directed onto photovoltaic surfaces or used to heat a transfer fluid for a conventional power plant. CSP is preferred over photovoltaics in the Western United States for large-scale central station installations, due in part to the availability of favorable concentrating solar resources.

**Distributed generation** — This refers to non-centralized electricity generation coming from various, often smaller sources, including households and businesses.

**Distribution Management System (DMS)** — Collects and utilizes data obtained from monitors, sensors and operable devices to provide remote, automated operation of end-point solutions.

**DOE (U.S. Department of Energy)** — Promotes America’s energy security through reliable, clean and affordable energy.

**DSM (Demand side management)** — The actions that influence the quantity or patterns of energy use by end-users.

**Electric vehicle (EV)** — A vehicle that uses one or more electric motors.

**Engineering, Procurement and Construction (EPC)** — A common form of contracting arrangement within the construction industry.

**EPA (U.S. Environmental Protection Agency)** — Federal agency with a mission to protect human health and the environment.
EPRI (Electric Power Research Institute) — Conducts research and development relating to the generation, delivery and use of electricity for the benefit of the public. Provides technology, policy and economic analyses to drive long-term research and development planning.

Federal Energy Regulatory Commission (FERC) — Federal agency with authority over electricity sales, wholesale electric rates, hydroelectric licensing, natural gas pricing and oil pipeline rates. FERC’s mission is to assist consumers in obtaining reliable, efficient and sustainable energy services at a reasonable cost through appropriate regulatory and market means.

Fracking — This is shorthand for hydraulic fracturing, an extraction process that injects pressurized water, sand and chemical agents into shale formations below the earth, allowing natural gas to flow up a well.

GDP — Gross Domestic Product.

Geothermal — Geothermal power is power extracted from heat stored in the Earth.

Greenhouse gases (GHG) — Gases in an atmosphere that trap heat. These gases raise the temperature of the Earth through the greenhouse gas effect. Without the greenhouse gas effect, the Earth would not warm enough for humans to live. But if the greenhouse effect becomes too strong because more greenhouse gases are being emitted, it could cause problems for humans, plants and animals. Greenhouse gases are produced through both natural processes and human activities. Water vapor is an example of a greenhouse gas that occurs naturally. The principal greenhouse gases that enter the atmosphere because of human activities are carbon dioxide, methane, nitrous oxides and fluorinated gases.

GIS (Geographic Information System) — System that captures, stores, analyzes, manages and presents data that are linked to a location.

GW (Gigawatt) — A gigawatt is equal to 1 billion watts.

HEV (Hybrid electric vehicle) — Vehicle that combines a conventional combustion engine with an electric propulsion system.

IGCC (Integrated gasification combined cycle) — This technology turns coal into gas — synthesis gas (syngas). IGCC then removes impurities from the coal gas before it is combusted, resulting in lower emissions of sulfur dioxide, particulates and mercury. The syngas is used to power a gas turbine, from which waste heat is passed to a steam turbine system.

KV (Kilovolt) — A kilovolt is a unit of potential equal to 1,000 volts. It is a measure of the potential energy of a unit charge at a given point in a circuit relative to a reference point (ground).

KW (Kilowatt) — Equal to 1,000 watts, the kilowatt measure is typically used to state the power output of engines and the power consumption of tools and machines.

KWh (Kilowatt-hour) — This is a unit of energy equal to 1,000 watt-hours. The watt-hour (symbolized Wh) is a unit of energy equivalent to 1 watt of power expended for one hour of time. The watt-hour is commonly used in electrical applications, and kilowatt-hours are commonly used to express customer electricity usage.

LNG (Liquefied natural gas) — LNG generally has been imported into the U.S. from other regions of the world. But as the shale gas resource base has been developed domestically, LNG terminal companies are applying for certificates to build LNG exporting facilities.

Metric ton — A metric ton is 2205.4 pounds.
MISO (Midwest Independent Transmission System Operator, Inc.) — MISO is an Independent System Operator (ISO) and the Regional Transmission Organization (RTO) that provides open-access transmission service and monitors the high-voltage transmission system throughout the Midwest United States and Manitoba, Canada. (An Independent System Operator is an organization formed at the direction or recommendation of the Federal Energy Regulatory Commission.) In the areas where an ISO is established, it coordinates, controls and monitors the operation of the electric power system, usually within a single American state, but sometimes encompassing multiple states.

MMBtu (1 million British thermal units) — The British thermal unit (Btu) is a traditional unit of energy. It is approximately the amount of energy needed to increase the temperature of 1 pound of water by 1 degree Fahrenheit.

MVP (Multi-Value Project) — Related to transmission, a Multi-Value Project is one greater than 100 kilovolts and more than $20 million (or 5 percent of the constructing Transmission Owner’s net transmission plant) and is part of a portfolio of projects that addresses energy policy laws and/or provides widespread benefits across the region. Benefits include reliability, public policy advancement, and economic and job creation impacts.

MW (Megawatt) — Equal to 1 million watts, this measure is commonly used to express generating capacity. For example, the Ameren companies generate a net capacity of nearly 16,000 megawatts of electricity.

MWh (Megawatt-hour) — A unit of energy equal to 1 million watt-hours. The watt-hour (symbolized Wh) is a unit of energy equivalent to 1 watt of power expended for one hour of time. The watt-hour is commonly used in electrical applications.

NRC (Nuclear Regulatory Commission) — This U.S. federal commission regulates commercial nuclear power plants through licensing, inspection and enforcement of its requirements.

O&M — Refers to operations and maintenance funds.

PEM fuel cells (Proton exchange membrane) — Common electrolyte is solid organic polymer perfluorosulfonic acid. Solid electrolyte reduces corrosion and electrolyte management problems. This fuel cell has a low temperature and quick start-up.

PEV (Plug-in electric vehicle) — Any motor vehicle that can be recharged from an external power source.

PHEV (Plug-in hybrid electric vehicle) — A hybrid vehicle with rechargeable batteries that can be charged by connecting a plug to an external power source.

Photovoltaic (PV) — This solar panel technology is used to directly convert the sun’s energy into electricity.

Powder River Basin — This generally refers to coal mined in the Western United States, which includes Wyoming, Utah and Colorado.

RPS (Renewable Portfolio Standard) — This is a mechanism to promote the installation of renewable generation, such as wind, solar and biomass. The regulation places an obligation on electrical companies to produce a certain percentage of their electricity from renewable energy sources.

RTO (Regional Transmission Organization) — An RTO is an organization that is responsible for moving electricity over large interstate areas. Ameren is currently a member of the Midwest Independent Transmission System Operator, or MISO, which is an RTO.

SCADA (Supervisory control and data acquisition) — Refers to an industrial control system used to monitor energy infrastructure. When this technology is integrated with a distribution management system, it would provide smart grid functionality related to fault location, quicker outage restoration, greater efficiency of operation and improved reliability.
**Smart grid** — Generally speaking, smart grid refers to a suite of technologies designed to enhance reliability, efficiency and customer service. It includes automation, voltage optimization, computer processing and two-way communication capabilities. For example, “smart” sensors and switches can detect an outage in a community and then isolate the interruption—minimizing the number of customers affected.

**SMR (Small modular reactors)** — This is a new concept for electric generation in the utility industry. The units use the experience from nuclear-powered Naval vessels and are small in size, but combine many of the reactor system components into a single model.

**SOFC (Solid oxide fuel cell)** — Fuel cell technology that is most suitable for utility use. Expected to be 50 percent to 60 percent efficient in converting fuel to electricity. SOFCs have fuel flexibility and can use a variety of catalysts.

**S-RECs (Solar Renewable Energy Credits)** — These credits permit the owner or purchaser to claim the benefits of clean energy production by subsidizing the cost of the installed solar system. They are available in states where a Renewable Portfolio Standard exists with a specific allocation for solar energy.

**Tcf (Trillion cubic feet)** — This is a volume measurement of natural gas.

**TBtu (Trillion British thermal units)** — This is a traditional measure for a unit of energy (see MMBtu).

**U.S. Eastern Interconnection** — The major power grid that serves the Eastern and Central United States.