Smart Energy Plan
A Forward-Looking, 5-Year Plan Designed to Modernize the Electric Grid, Drive Customer Benefits and Ensure Stable and Predictable Rates

Senate Bill 564 made possible Ameren Missouri’s Smart Energy Plan. This plan is transforming the grid to ensure customers have affordable, reliable and cleaner energy that meets their growing needs and expectations.

Key Elements of the Smart Energy Plan
- $5.3B in electric investments over the next 5 years
  - Requires a minimum of 25% annual investment in Grid Modernization
  - Allows up to 6% of capital for smart meter program
  - Encourages renewable energy by providing up to $28M in solar rebates to customers, and requiring a minimum $14M investment in Ameren owned solar
- Catalyzes economic development and provides job creation
- Delivered a ~6% rate cut in August 2018, and freezes rates until April 2020

Public Stakeholder Meeting: March 4th
- Millbottom Event Center in Jefferson City
- Doors open at 5:30 PM
- Mark Birk to give overview at 6:00 PM
Ameren Missouri’s Smart Energy Plan Vision is Driven by Customers

**Vision**
Ameren Missouri's grid is secure, modern, affordable, resilient and reliable, which enables transformational choices and benefits for our Customers, Communities, and Co-workers.

**Principles**

- Deliver on Our Promises and Execute Consistently
- Provide Financial Stewardship on Behalf of All Stakeholders
- Deliver Distinctive Customer and Community Value
- Enable a Smart, Flexible Grid
- Ensure a Safe, Secure, Reliable, and Resilient Grid
It will Transform Today’s Grid into the Grid of the Future

Customers are counting on a grid that will be smarter, self-healing, more robust, resilient, and secure

Today

- Grid – Reliable, efficient, meets peak demand, aging infrastructure, one directional energy flow
- Generation Portfolio – Heavy coal-based, limited renewables, distributed energy resources
- Customer – Homogenous service, few special offerings

Tomorrow

- Grid – Upgraded infrastructure, smart meters, smart technology, sensors and data analytics to drive reliability, efficiencies, and resiliency
- Generation Portfolio – Cleaner, more diverse, expansion of renewable and distributed energy resources
- Customer – Customer centric services and product offerings delivering affordable electricity to consumers where they want it, when they want it, and how they want it
## Smart Energy Plan 5YR Total Capital Overview (Thousands $)

A 5-year average of 37% of capital investments will go toward grid modernization

<table>
<thead>
<tr>
<th>Category</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart, Reliable Grid Operations</td>
<td>$335,042</td>
<td>$451,058</td>
<td>$406,117</td>
<td>$391,472</td>
<td>$360,506</td>
<td>$1,944,195</td>
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<tr>
<td>Smart Meter Program</td>
<td>$30,034</td>
<td>$54,870</td>
<td>$51,966</td>
<td>$55,995</td>
<td>$52,117</td>
<td>$244,982</td>
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<tr>
<td>Non-Nuclear Generation &amp; Environmental</td>
<td>$186,348</td>
<td>$176,756</td>
<td>$182,326</td>
<td>$196,643</td>
<td>$226,609</td>
<td>$968,682</td>
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<tr>
<td>Nuclear Generation</td>
<td>$74,684</td>
<td>$65,896</td>
<td>$61,411</td>
<td>$76,451</td>
<td>$73,984</td>
<td>$352,426</td>
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<tr>
<td>Hydro Generation</td>
<td>$34,825</td>
<td>$33,627</td>
<td>$43,395</td>
<td>$33,499</td>
<td>$14,955</td>
<td>$160,301</td>
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<tr>
<td>Renewable &amp; Gas Turbine Generation</td>
<td>$11,948</td>
<td>$21,782</td>
<td>$20,104</td>
<td>$25,732</td>
<td>$19,339</td>
<td>$98,905</td>
</tr>
<tr>
<td>Secure &amp; Reliable Transmission</td>
<td>$141,184</td>
<td>$135,658</td>
<td>$153,958</td>
<td>$148,264</td>
<td>$154,070</td>
<td>$733,134</td>
</tr>
<tr>
<td>Cyber &amp; Technology Upgrades</td>
<td>$88,542</td>
<td>$89,955</td>
<td>$89,849</td>
<td>$89,877</td>
<td>$89,873</td>
<td>$448,096</td>
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<tr>
<td>Operational &amp; Customer Support Facilities</td>
<td>$54,393</td>
<td>$96,518</td>
<td>$58,560</td>
<td>$50,817</td>
<td>$53,505</td>
<td>$313,793</td>
</tr>
<tr>
<td>Innovative Opportunities</td>
<td>$14,302</td>
<td>$9,064</td>
<td>$5,799</td>
<td>$4,947</td>
<td>$3,852</td>
<td>$37,964</td>
</tr>
<tr>
<td><strong>Grand Total - Capital</strong></td>
<td><strong>$971,302</strong></td>
<td><strong>$1,135,184</strong></td>
<td><strong>$1,073,485</strong></td>
<td><strong>$1,073,697</strong></td>
<td><strong>$1,048,810</strong></td>
<td><strong>$5,302,478</strong></td>
</tr>
<tr>
<td>Wind Asset Acquisition (two sites)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$1,000,000</td>
</tr>
<tr>
<td><strong>Grand Total, Including Wind</strong></td>
<td><strong>$971,302</strong></td>
<td><strong>$2,135,184</strong></td>
<td><strong>$1,073,485</strong></td>
<td><strong>$1,073,697</strong></td>
<td><strong>$1,048,810</strong></td>
<td><strong>$6,302,478</strong></td>
</tr>
</tbody>
</table>
## Top Smart, Reliable Grid Operations Investment Categories
(Millions $)

Our investment strategy establishes a modern grid to address the needs of our communities and businesses.

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>2019 - 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Substations</strong></td>
<td>$69</td>
<td>$267</td>
</tr>
<tr>
<td><strong>Smart Meter Program</strong></td>
<td>$30</td>
<td>$245</td>
</tr>
<tr>
<td><strong>Smart Grid</strong></td>
<td>$24</td>
<td>$142</td>
</tr>
<tr>
<td><strong>System Hardening</strong></td>
<td>$16</td>
<td>$121</td>
</tr>
<tr>
<td><strong>Solar</strong></td>
<td>$12</td>
<td>$95</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Plan</strong></th>
<th><strong>Customer Value</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>70+ new or upgraded substations; Optimize system by reducing the overall number of substations by 5-10% in the long-term</td>
<td>State-of-the-art design features that enable optimal long term performance and customer affordability benefits</td>
</tr>
<tr>
<td>Deploy more than 800K smart meters of Ameren MO’s 1.2M electric meter population in the next 5 years</td>
<td>Faster connect/reconnect, decreased overall meter reading cost, and improved outage communications</td>
</tr>
<tr>
<td>By 2023, deploy ~600 switching devices and accompanying communications technologies to limit the impact of an outage</td>
<td>Deploying self-healing equipment to rapidly detect and isolate storm-related and other circuit interruptions, speeding power restoration for customers</td>
</tr>
<tr>
<td>Target Worst Performing Sub-Transmission Circuits</td>
<td>Boost reliability to communities, critical facilities (e.g., hospitals, water/treatment facilities), major employers, and manufacturers</td>
</tr>
<tr>
<td>Community Solar &amp; Solar Partnership projects, plus other solar opportunities</td>
<td>Meets growing renewable &amp; sustainability interests</td>
</tr>
</tbody>
</table>
Grid Operations Key Investments

Planned Execution Examples

**Substation Modernization**  
**Pershall** (North St. Louis County)  
- Consolidate four end-of-life substations to one modern, smart substation  
  - Outage performance for this class of modern substations is 88% better than the 4 current substations  
  - Significant reliability improvements for 12,000+ customers with a history of frequent outages  
- In addition to the substation upgrade, significant circuit improvements are planned which include building in redundancies and self-healing technologies, and partial undergrounding  
- Construction begins Q1 2020

**Downtown Jefferson City Smart Grid Project**  
- Construct a self-healing grid by upgrading eight manual switchpads to automated switchpads  
  - In the last 5 years, eight unplanned extended outages resulted in 784 customer interruptions; most less than one hour  
  - New equipment locates the outage and isolates the fault, allowing power restoration to customers on the working cable sections  
  - The self-healing grid creates significant customer benefits, with outage time for some customers reduced from hours to seconds  
- Construction begins Q1 2019

**System Hardening Conway 81**  
- Upgrade 10.5 miles of subtransmission lines with more resilient assets to better serve Missouri Baptist, Mercy, BJC Children’s hospitals and 400+ residential customers  
- Install 20 new composite poles (stronger material, storm hardening) and 115 new wooden poles, install fiber conductors for communications, upgrade to more effective lightning protection equipment, and install self-healing DA devices  
  - Reduce momentaries that can impact direct and indirect customers (e.g., hospital patients)  
- Construction begins Q1 2019

**Customer Benefits**

- Reduced Frequency & Duration of Outages  
- Reduction of Momentary Outages  
- Fewer Truck Rolls  
- Faster Restoration Time  
- Improved Resiliency
Innovative Solar Solutions

Objectives:

- **Customer Affordability** – Provide opportunities for customers to participate in and contribute to community solar programs and Ameren Missouri-owned solar projects
- **Renewable Penetration** – Increase solar energy production to give our customers clean energy options
- **Reliability** – Look to evaluate future project opportunities that could provide reliability benefits

### Community Solar
Monitor progress and interest in Community Solar Pilot Program

- Install a 1-MW solar facility at Lambert Airport and offer solar energy to smallest rate classes
- Fully subscribed in <8 weeks, with waitlist increasing daily

### Distributed Solar Partnership
Develop relationships with customers for solar partnerships

- Develop 1.8 MW solar car port canopy at BJC HealthCare
- Pursuing other similarly sized solar opportunities with customers

### Other Solar Opportunities
Explore non-wire alternatives for clean energy

<table>
<thead>
<tr>
<th>Year</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Investment</strong></td>
<td>$12M</td>
<td>$83M</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$95M</td>
</tr>
</tbody>
</table>
Smart Meter Program

Objectives:

• **Technology Upgrade** – Current meter system is approaching end-of-life and will not be supported by vendor after 2025

• **Customer Affordability** – Keep customer rates affordable through reduced meter infrastructure operating costs (e.g., eliminating the existing AMR system reduces meter reading costs per customer by ~40%) once fully implemented

• **Customer Experience** – Provide customers more options and control through enhanced product and service offerings, e.g., improved outage communications, rate options, and superior online energy usage visibility

• **Operational Performance** – Eliminate truck rolls associated with move in/move out and other remote connect/reconnect processes to significantly decrease customers’ wait time for service connection changes (e.g., reconnecting service after moving into a home)

Deployment Goals

• Install the first smart meter in July 2020

• AMI deployment of ~67% of Ameren MO’s electric meter population by EOY 2023

• Install 120,000 electric meters in 2020; install 240,000 electric meters annually between 2021 - 2023

• Full deployment completed in 2025

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</thead>
<tbody>
<tr>
<td>Investme</td>
<td>$30M</td>
<td>$55M</td>
<td>$52M</td>
<td>$56M</td>
<td>$52M</td>
<td>$245M</td>
</tr>
</tbody>
</table>

* All estimates based on pending contracts
Tying Investments to Customer Value

This interactive dashboard will be used to track key components of our Smart Energy Plan by Division, Operating Center, and Zip Code.

- Project / Category
- Customer
- Reliability data
- Outage causes
The Smart Energy Plan

Transforming the energy grid of today, powering the quality of life for our customers, communities, and co-workers for generations to come

Customers

- Stable and predictable rates
- More options and controls as a result of enhanced product and service offerings

Communities

- Greater reliability and resiliency
- Job creation (direct & indirect)
- Access to cleaner energy sources

Co-workers

- Enhanced safety & security
- Help our co-workers deliver on our customer-first commitments with new tools and technologies

Transforming the energy grid of today, powering the quality of life for our customers, communities, and co-workers for generations to come.