Electric Power Research Center Fact Sheet:

**History:** The Electric Power Research Center (EPRC) began in 1963 as the Power Affiliate Research Program, founded in order to advance research and graduate education in electric power systems and to strengthen industry ties to the department.

**Governance and Budget:** The Center is advised by a Technical Advisory Committee (TAC) of industry members and has a budget of approximately $270,000 from member fees, grants and continuing education courses, used primarily to fund graduate student research and develop professional education offerings. EPRC meets with its members twice a year to provide research updates and choose new projects.

**Membership:** Full Membership is an annual contribution of $25,000 or more and allows the member to appoint a representative to the TAC with one full vote per $25,000 block. A Contributing Membership level is flexible, typically at least $5,000. A Contributing Member has a representative at the TAC meetings and has a fractional vote proportional to their level of contribution.

**Current Members:** The EPRC has eight industry members: Alliant Energy, the Central Iowa Power Cooperative, the City of Ames, the City of Cedar Falls, Corn Belt Power Cooperative, ITC Midwest, MidAmerican Energy, and the Midcontinent Independent System Operator (MISO).

**Research teams:** include faculty from Electrical and Computer Engineering (power engineering and cyber security), Industrial and Manufacturing Systems Engineering, Materials Science and Engineering, Mechanical Engineering, Civil, Construction and Environmental Engineering, Statistics, Economics, and Geological and Atmospheric Sciences. Industry advisors participate in developing and reviewing projects.

EPRC is a catalyst for collaboration among faculty, industry, state agencies, national labs, federal agencies and national trade associations, on grants to advance the electric power industry. EPRC participates in DOE and NSF grants as well as a grant from the American Public Power Association, with technology transfer from these projects available to members.

**Research topics:** Research reflects challenges that come from a rapidly changing power industry and changes in standards and markets. Recent projects include development of new tools to improve grid reliability and security, optimization of generation resource planning focusing on renewable integration, studies of risk management in wholesale and retail power markets, improvement of meteorological models for wind forecasting, design of new aluminum composite conductor, the impact of smart grid developments on markets and transmission planning, development of condition-based maintenance tools, and resiliency planning for distribution systems.

**EPRC-funded Projects 2010-2018:**

<table>
<thead>
<tr>
<th>Year</th>
<th>Project Description</th>
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<tbody>
<tr>
<td>2010-2011</td>
<td>Generation Expansion Planning: Portfolio Optimization</td>
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<td>2010-2012</td>
<td>Analysis of very low frequency oscillations</td>
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<tr>
<td>2010-2011</td>
<td>Optimal allocation of dynamic VAR sources for enhancing power system dynamic security</td>
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2010-2011  Embedded sensor network and decision algorithms for robust power system
2011-2013  Optimal online control strategies to maintain high voltage security in large scale power systems
2012-2014  Measuring stress across an area of a power system with area angles
2013-2015  PMU-based real time short term stability monitoring transmission planning and defense plans
2014-2016  Fast monitoring of voltage collapse and cascading outages with PMUs
2015-2017  Opportunities and Benefits for Deploying VSC-Based HVDC
2015-2017  Assessing the impacts of geomagnetic disturbances on Midwest transmission system reliability
2015-2017  Real-time monitoring and control of long-term voltage stability with high wind penetration via local linear regression
2015-2017  Development of integrated software to study impact of distributed generation on grid reliability

Projects 2016-2019
2016-2018  Impacts of power transformer overload ratings on transformer reliability and life
2018-2019  Battery Modeling and Operational Support

Markets
2010-2012  Financial and Operational Risk Management for Restructured Wholesale Markets
2010-2012  Forecasting sales of PHEVs and PHEV users’ recharging behavior
2010-2013  Integrated retail and wholesale power system operation with smart-grid functionality
2012-2014  Risk assessment of unit commitment cost under uncertainty
2015-2016  Integrated Distribution and Transmission Effects of Demand-Response Initiatives

Wind modeling
2010-2011  Impact of wind power on control performance standards and frequency regulation contributions of DFIG wind generators
2010-2011  Design of a meteorological model ensemble forecasting system for improved wind energy forecasting
2011-2013  Resource to backbone transmission design for very high wind penetration
2013-2015  Wind turbine generator and wind power plant modeling
2014-2016  Leveraging a geographic information system in high wind penetration transmission design

Projects 2016-2018
2016-2018  Functional assessment of DFIG and PMSG-based wind turbines for grid support applications.

Materials
2011-2013  Developing high conductivity, ultralight hi-strength aluminum composite conductor
2013-2015  Phase 2 development of a stronger, lighter, more conductive high voltage transmission conductor material.