

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 of industry members and has a budget of approximately \$285,000, from member fees and grants, used primarily to fund graduate student research. EPRC meets with its members twice a year to review research progress and select new projects.

Membership: Full Membership requires an annual contribution of \$25,000 or more and allows the member to appoint a representative to the Technical Advisory Committee (TAC). A Full Member has one vote on the TAC for each annual 25,000 block contribution. Contributing Membership requires a minimum annual contribution of \$5,000. A Contributing Member may send a representative to the TAC meetings and has a fractional vote proportional to their level of contribution.

Current Members: The EPRC has ten 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, the MidContinent Independent System Operator (MISO), the Réseau de Transport d'Electricité (RTE, France) and Colombia's state power wholesaler, XM.

Research teams: The EPRC has brought faculty together from several departments including Electrical and Computer Engineering, Industrial and Manufacturing Systems Engineering, Materials Science and Engineering, Economics, and Geological and Atmospheric Sciences. Advisors from industry participate in the development and review of projects undertaken by the EPRC.

Research is wide-ranging, reflecting changing issues of concern to the power industry, including: development of new tools to improve grid reliability and security, optimization of generation resource planning (including renewables), studies of risk management in wholesale and retail power markets, improvement of meteorological models for wind forecasting, design of new aluminum composite conductor, and the impact of smart grid developments on markets and transmission planning.

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Research Projects by EPRC 2010-2014 and new projects starting July 2015

Power System Operation and Planning:

- 2010-2011: Generation Expansion Planning: Portfolio Optimization
- 2010-2012: Analysis of very low frequency oscillations
- 2010-2011: Optimal allocation of dynamic VAR sources for enhancing power system dynamic security
- 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
- New Projects funded for 2015-2017:*
- 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*

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
- New project funded for 2015-2016:*
- 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

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