

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 nine 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), and the Réseau de Transport d'Electricité (RTE, France).

Research teams: include faculty from Electrical and Computer Engineering, Industrial and Manufacturing Systems Engineering, Materials Science and Engineering, Economics, and Geological and Atmospheric Sciences. Industry advisors participate in developing and reviewing projects. EPRC also acts as a catalyst for collaboration among faculty, industry, the Iowa Energy Center, national labs and federal agencies, on grants to advance the electric power industry. In 2016 EPRC will participate in two DOE grants.

Research topics: 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.

Recent Projects:

Power System Operation and Planning

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| 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 |

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EPRC Research Projects 2010-2016

- 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

Current projects 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
- 2015-2017 Development of integrated software to study impact of distributed generation on grid reliability

Projects 2016-2018

- 2016-2018 *Impacts of power transformer overload ratings on transformer reliability and life*
- 2016-2018 *Power Grid Resilience: Assessment, Enhancement and Outage Management*

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.