

Energy Trends Workshop, Iowa Electrification Panel

Anne Kimber, EPRC Director,

<https://www.ece.iastate.edu/eprc/>

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Background: EPRC: Started in 1963 as Power Affiliates Program

“Advance research and graduate education in electric power systems; strengthen industry ties”

Industry Members:

- Alliant Energy
- City of Ames
- Cedar Falls Utilities
- Central Iowa Power Cooperative
- Corn Belt Power Cooperative
- International Transmission Company
- MidAmerican Energy
- MidContinent Independent System Operator
- Northwest Iowa Power Cooperative

EPRC: Catalyst for collaboration in ISU-industry-National Laboratories power systems R&D and technology transfer, to strengthen undergraduate and graduate education in energy infrastructure.

We study power systems from large interconnected transmission grids to microgrid-scale- with strength in fundamental and applied work in transmission and distribution planning and operation, and cybersecurity.

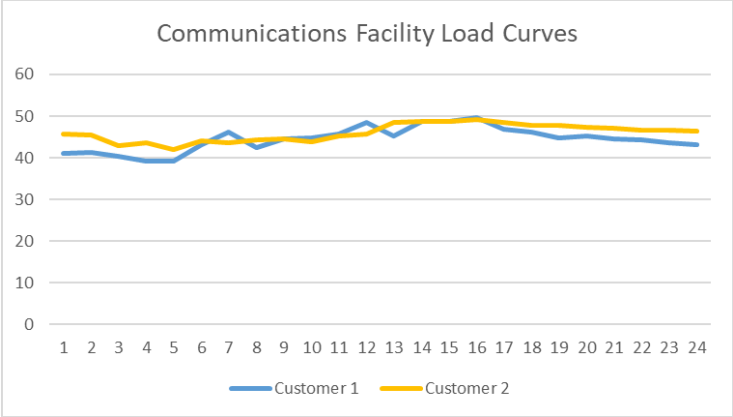
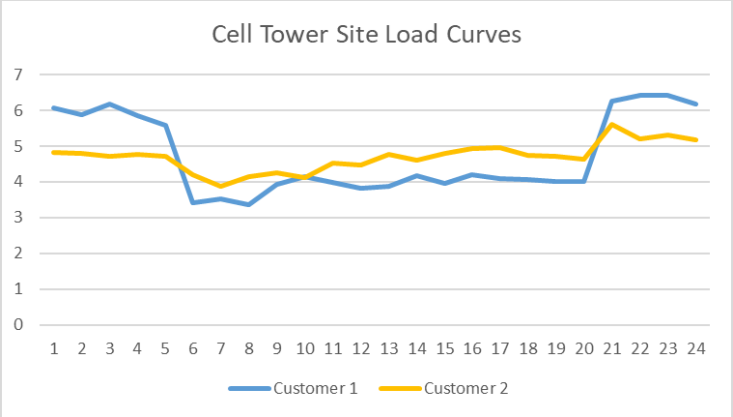
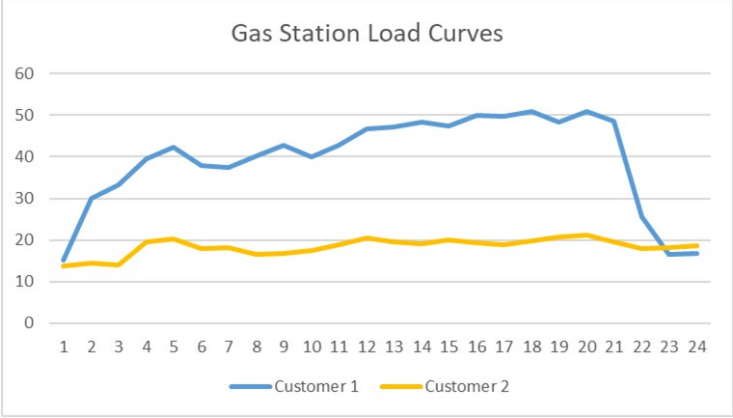
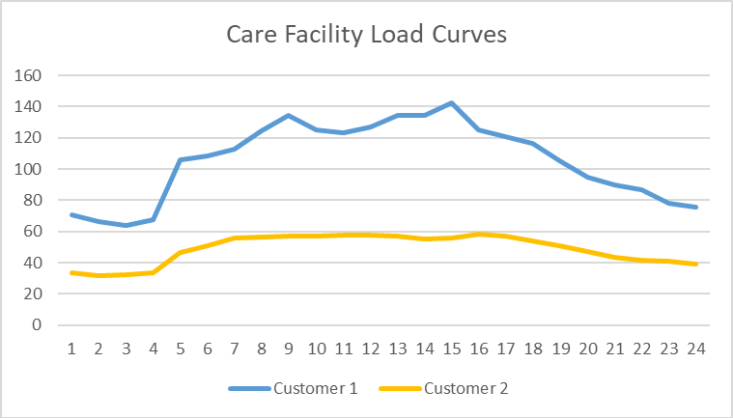
Research and education driven to improve reliability and security of the grid as more variable and distributed generation resources are connected, and as loads also become more variable.

Other Collaborators: Algona Municipal Utilities, Maquoketa Valley Electric Cooperative, Iowa Lakes Electric Cooperative, Iowa Army National Guard, Department of Energy, Idaho and Sandia National Labs (and other National Labs), National Science Foundation, American Public Power Association, SunCrate, PowerFilm

Power Systems Engineering Faculty: Experts in their profession

- **Venkataramana Ajarapu**, Whitney Professor, IEEE Fellow, vajjarap@iastate.edu; voltage stability, T&D co-modeling
- **Chao Hu, Mechanical Engineering**; battery testing, battery state estimation, battery life prediction, chaohu@iastate.edu
- **Ian Dobson**, Sandbulte Professor, IEEE Fellow, Dobson@iastate.edu; voltage collapse, cascading outage
- **Manimaran Govindarasu**, Marston, Harpole Professor, IEEE Fellow, gmani@iastate.edu; cyber security of power systems
- **Jim McCalley**- Marston, London Professor, IEEE Fellow, jdm@iastate.edu; SEAMS project, co-optimization of generation and transmission planning, wind energy integration
- **Hugo Villegas-Pico**, Harpole-Pentair Assistant Professor, Power Systems, Power Electronics and Controls, hvillega@iastate.edu
- **Zhaoyu Wang**, Northrop Grumman Associate Professor, wzy@iastate.edu; Distribution Systems, renewable energy integration

Use cases: Summer peak day demand profiles for critical customer loads



Modeling PV and battery storage to serve an Iowa Care facility

Abdelrahman Mannan, Dylan Miley, Nicholas David, Anne Kimber, funded by EPRI GridEd

Iowa care facility:
Average consumption:
310 kWh/day
28.6 kW peak

Energy Adequacy
Model for microgrid
with:

160 kW solar array
(NREL solar data)
944 kWh battery

-sized for lowest
levelized cost of
energy

