

4910 Lightning Talk 1: Market Research

Sean Carver, Bethany Danley,
Thomas Edwards, Nathan Kallal,
Mina Khalil, MacKenzie Woods

Project Overview

- Evaluate load profile of ISU microgrid
- Create contingency plan in case of failure of critical infrastructure
- Create designs to address weaknesses in current infrastructure
- Prioritise renewable energy

Problem Statement

The Iowa State Microgrid has some functional and future planning upgrades that are needed:

- Connect the entire campus to the microgrid
- Plan for future load growth
- Add in protection coordination to stop large power outages
- Replace and upgrade old and not functional equipment
- Include and switch to renewable energy sources

List & Description of Related Projects

Key Characteristics of Other Projects:

- 75% fewer emissions than conventional gas plant (UC San Diego Microgrid)
- Self-Sufficient Generation, independent from the grid (MIT Microgrid)
- Enhanced Reliability due to smart switches and underground cables (Illinois Tech Microgrid)
- Synchronous Operation with outside grid to buy/sell power (Princeton Microgrid)
- “Smart” Microgrid reducing energy consumption by 50%, cutting costs by 20% (Santa Clara Microgrid)



Description of Market Gap

Upgraded Facilities & Equipment

- Upgrading facilities up to current will lead to enhanced reliability and reduced maintenance cost, saving money in the long term

Enhanced Reliability/Smart Grid

- increasing reliability and incorporate smart devices will lead to more efficient use of energy and less wasted power, reducing extra costs

Enhanced Reliability

- A more reliable system similarly leads to less maintenance costs, as outages are less frequent and less severe

Reselling Energy

- By incorporating renewable energy and other generation sources, we can create a situation where the university can turn a profit selling energy back to the grid

New Ideas from Research

Hybrid Microgrid

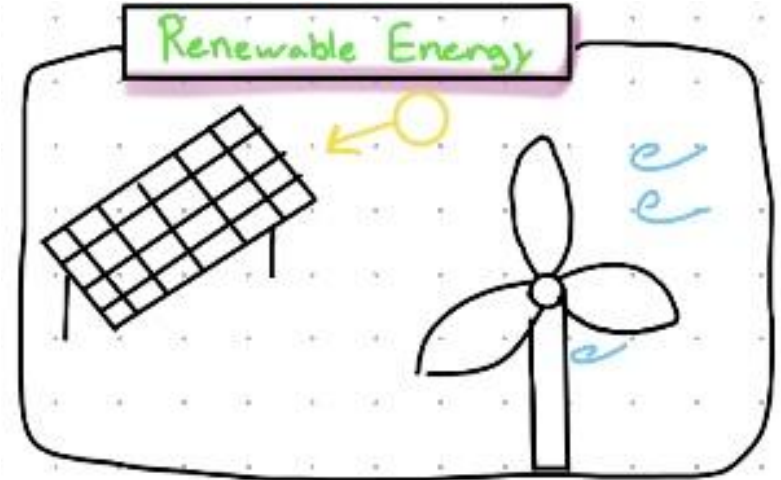
- Enhanced reliability and feasibility
- Cost-effective
- Environmental benefits

Smart Energy Management System

- Enhances energy efficiency
- Reduces waste
- Increases reliability

Energy Storage System (ESS)

- Provide backup power during outages
- Reduces peak demand charges
- Supports the use of more renewable energy



Conclusion

We believe that by addressing key areas such as reliability, renewable energy integration, and outdated infrastructure, we can significantly enhance the ISU microgrid. Drawing on successful projects like those at UC San Diego and MIT, we propose implementing a hybrid microgrid and smart energy management system. These upgrades will improve efficiency, reduce costs, and potentially turn the microgrid into a profit-generating asset through energy reselling.