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GALVIN ELECTRICITY INITIATIVE

Sponsored by The Galvin Project, Inc.

Perfect Power Prototype for Illinois Institute of Technology

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Principal Investigator

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Project Overview

- Funded by the U.S. Department of Energy
- $12M ($7M from DOE, $5M Cost Share)
- 5 year project
- Located at Illinois Institute of Technology (IIT)
- Involves the entire campus
- Partners: IIT, Exelon, S&C, Schweitzer, Endurant

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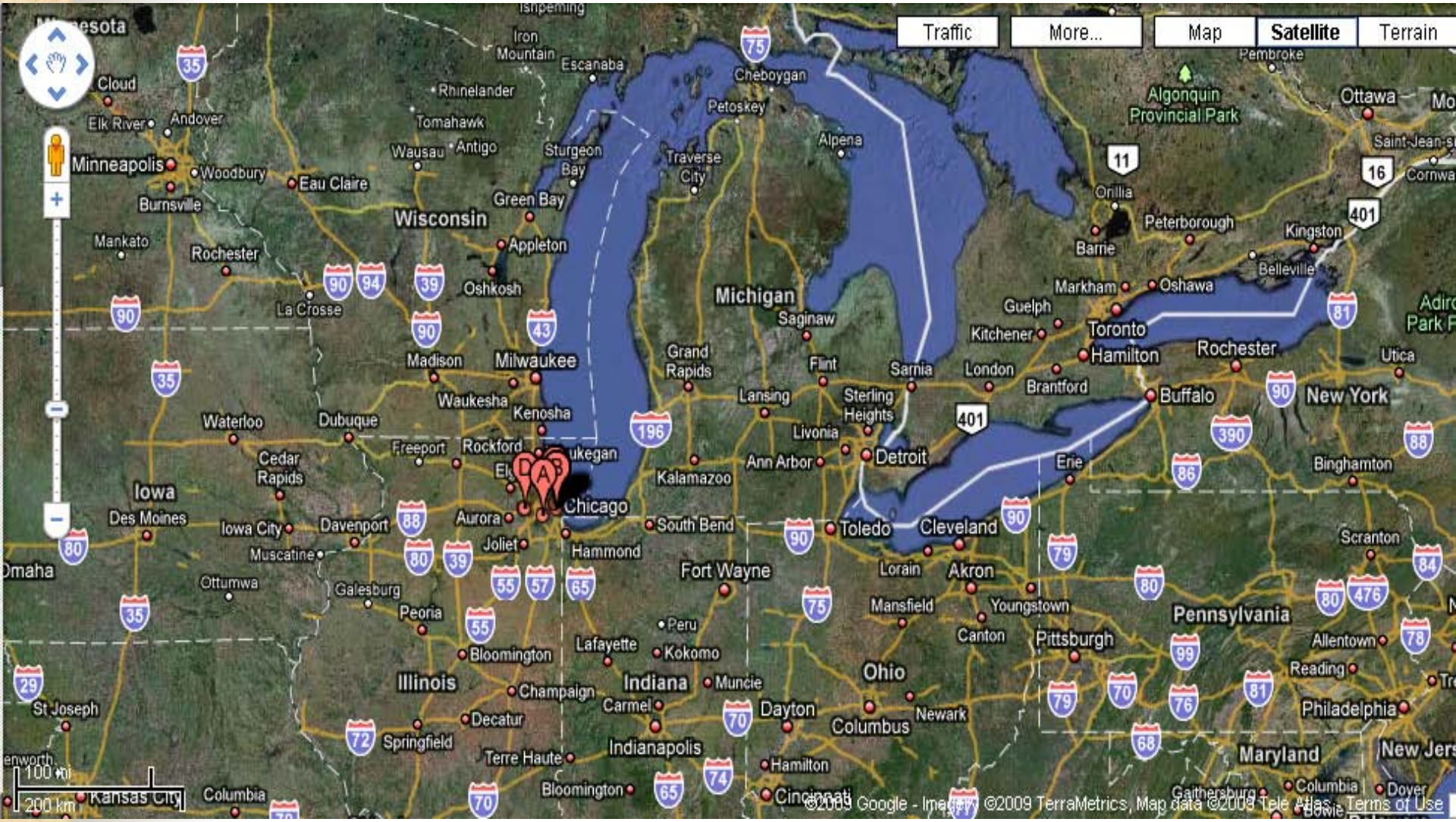

Project Uniqueness

- IIT is essentially a town in an urban setting
  - 120 Acres with public roads, streetlights, and public transportation
  - Owns its electric infrastructure with an 8MW gas turbine plant
  - 600 Residential units
  - 80 Commercial Tenants
  - Public buildings: admin/office spaces, auditorium spaces, Campus Centers (“Town Halls”), Libraries, Laboratory spaces

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Vision for Perfect Power

"The perfect power system will ensure absolute and universal availability of energy in the quantity and quality necessary to meet every consumer's needs. It is a system that never fails the consumer."

Bob Galvin

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Project Objectives

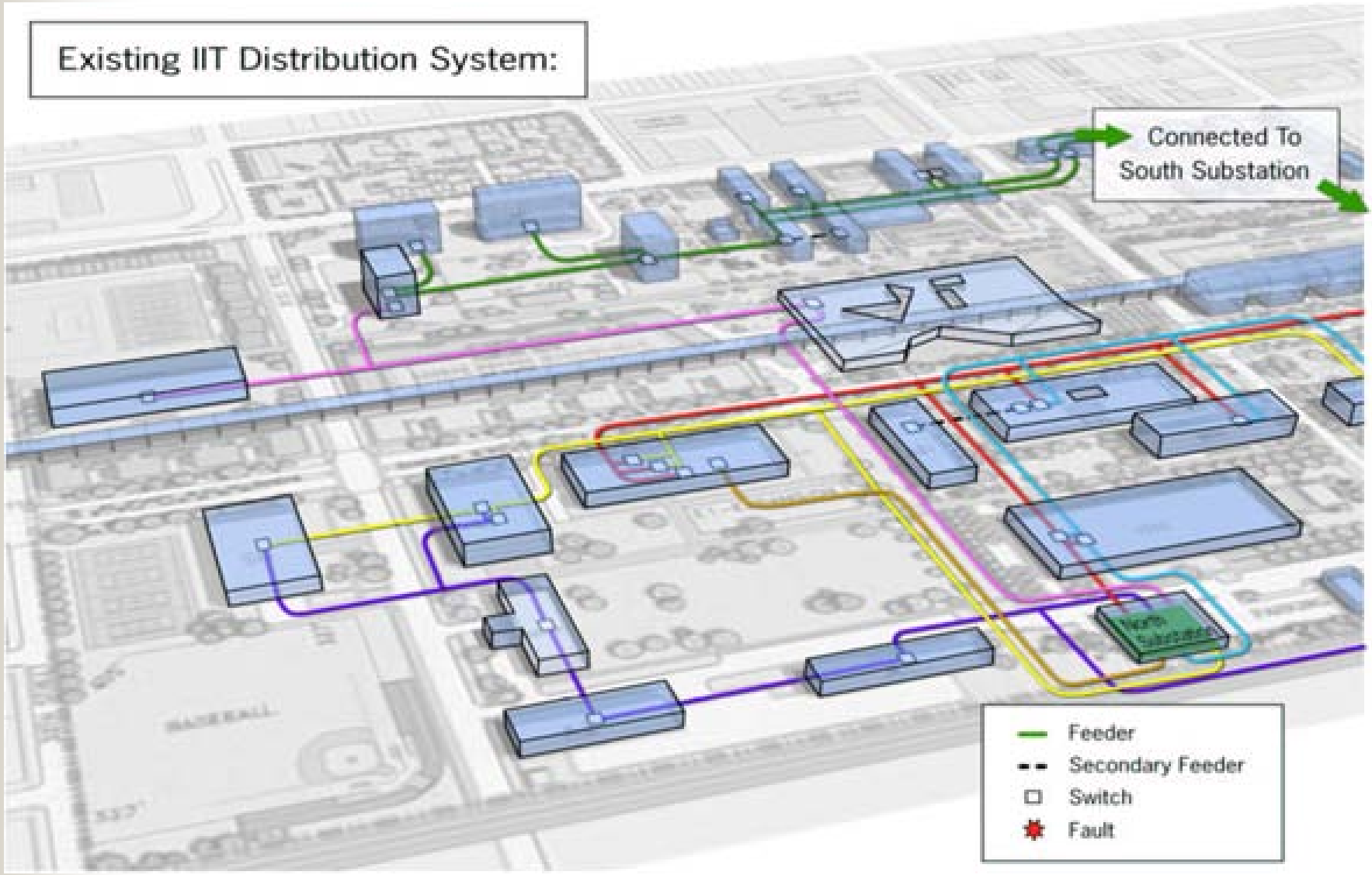
- 50% peak demand reduction
- 20% permanent demand reduction
- Demonstrate the value of Perfect Power
  - Cost avoidance and savings in outage costs
  - Deferral of planned substations
- New products and commercialization
- Replicable to larger cities
- Promotion of energy efficiency and cleaner cities

Project Challenges

- At least three power outages per year
  - Costs = up to $500,000 annually in restoration costs, lost productivity and ruined experiments
- Electricity costs were doubled within the last decade
- Addition of two new resident halls require more power
- Campus electricity infrastructure would need to be upgraded
- Electricity demand is growing with increased student population
- Installation of additional building equipment adds to energy use
- Renegotiating electricity contract will allow real-time pricing

Proposed Solutions

- Self-sustaining infrastructure
- Intelligent distribution system
- On-site electricity production
- Demand response capability (A/C, lighting, major loads)
- Intelligent perfect power system controller
- Sustainable energy systems and green buildings
- Technology ready infrastructure


Existing IIT Distribution System:
Connected To South Substation
Feeder
Secondary Feeder
Switch
Fault

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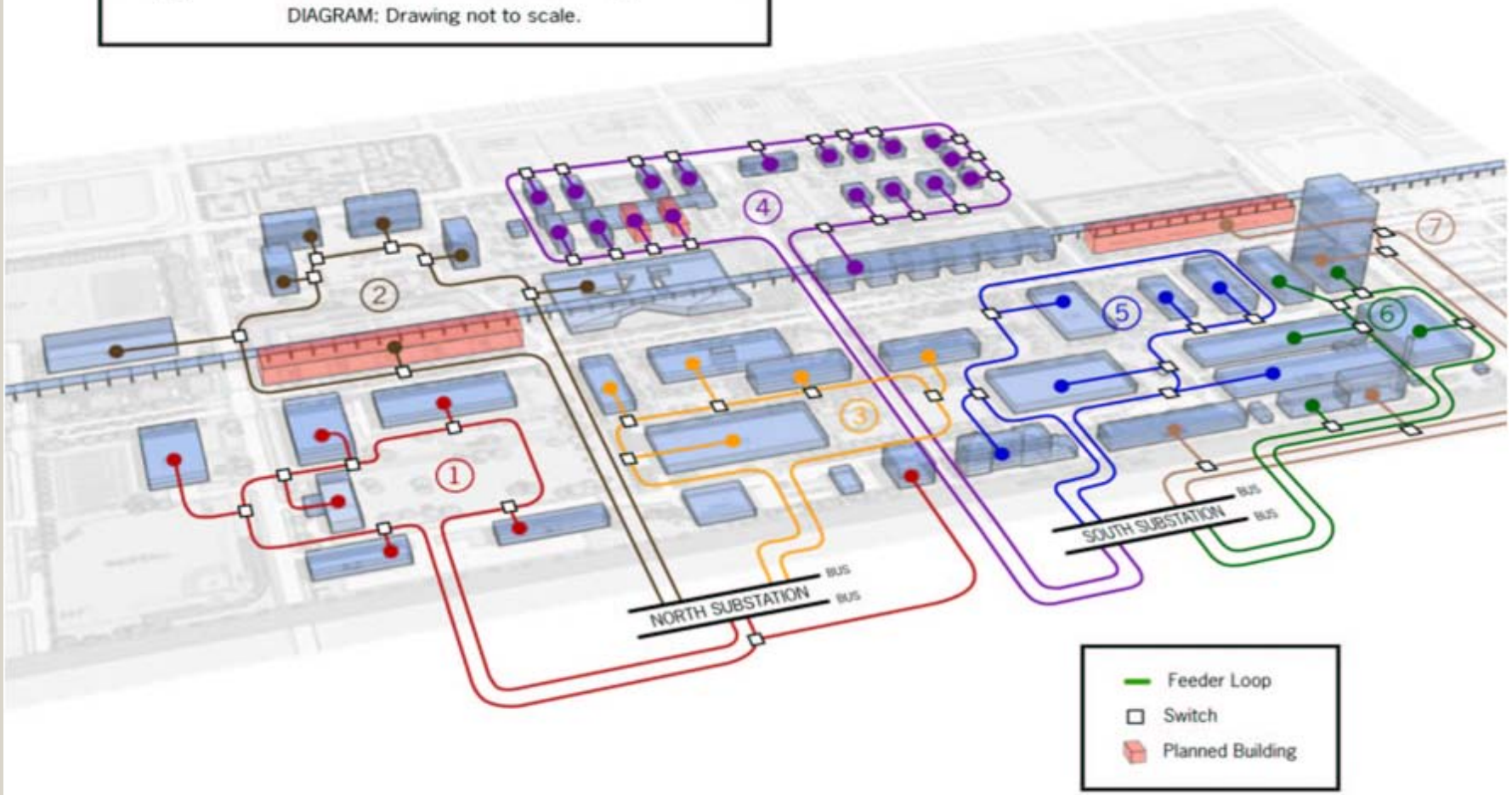
DEPARTMENT OF ENERGY · UNITED STATES OF AMERICA

High Reliability Distribution System:

DIAGRAM: Drawing not to scale.



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Project Tasks

- Phase I is to establish the basis for Perfect Power
- Phase II is to address key technology gaps
  - Task 1.0 – Advanced Distribution Automation and Recovery System
  - Task 2.0 – Buried Cable Fault Detection and Mitigation
  - Task 3.0 – Intelligent Perfect Power System Controller
  - Task 4.0 – Advanced ZigBee-Based Wireless
- Phase III is to prepare IIT for real time pricing and ancillary markets
- Phase IV is to deploy the advanced campus distribution system
- Phase V is to deploy campus distribution level peak load reduction

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Vista Switch – Motor Controls and Relays

Project Demonstration Updates

- Completed the conceptual design for year one
- Initiated manufacturing of switchgear for High Reliability Distribution System
- Completed the cost estimating of installation projects
- Began underground location work and site coordination for the project installations

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Project Research Updates

- Established autonomous agent-based perfect power controls and unbalanced three-phase distribution system simulator
- Designed the IPPSC for campus energy and control system
- Completed the design of ZigBee sensor controls and wireless communications for the building automation

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