SSPS Node Demonstration

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The Numbers

- DOE PROGRAM OFFICE:
  OE – Transformer Resilience and Advanced Components (TRAC)
- FUNDING OPPORTUNITY:
  AOP
- LOCATION:
  Birmingham, Alabama
- PROJECT TERM:
  11/1/2022 to 12/31/2023
- PROJECT STATUS:
  Ongoing
- AWARD AMOUNT (DOE CONTRIBUTION):
  $650,000
- AWARDEE CONTRIBUTION (COST SHARE):
  $125,000
- PARTNERS:
  Oak Ridge National Laboratory

Project Summary

Objectives

- Transfer technology-Based on prior R&D at ORNL
- Validate SSPS fundamentals safely
- Educate internal workforce on SSPS technology

Measures of Success

- Successful installation and commissioning
- Zero catastrophic failures or safety incidents
- Hands-on lab demonstrations for utility groups

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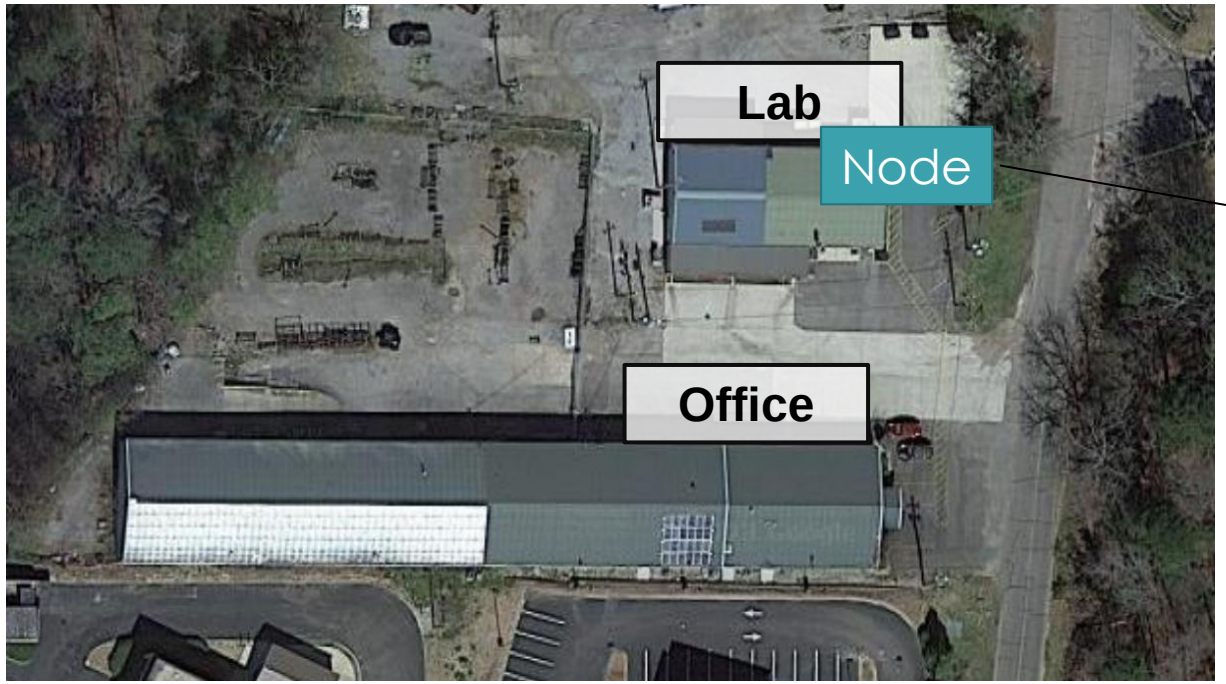
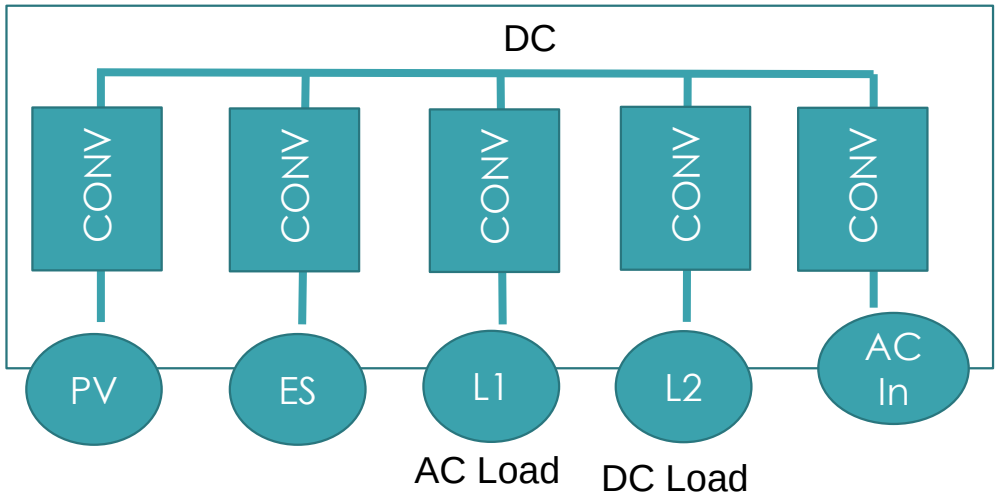
Project Summary

Force	Effect
Bulk deployment of solar & storage	Bi-directional flows, co-located load and generation on Distribution, microgrids
Electrification of transportation	Load growth, hot spots, grid dependency, large capacity requirements
Consumer to prosumer	Financial incentives, integration gaps
Other decarbonization	Fleet retirements, transmission rebuild, operational stability concerns
Increasing cyber & natural threats	Stringent security requirements, new resilience focus, short-repair time needs
Energy equity	Downward rate pressure, scrutiny of costs

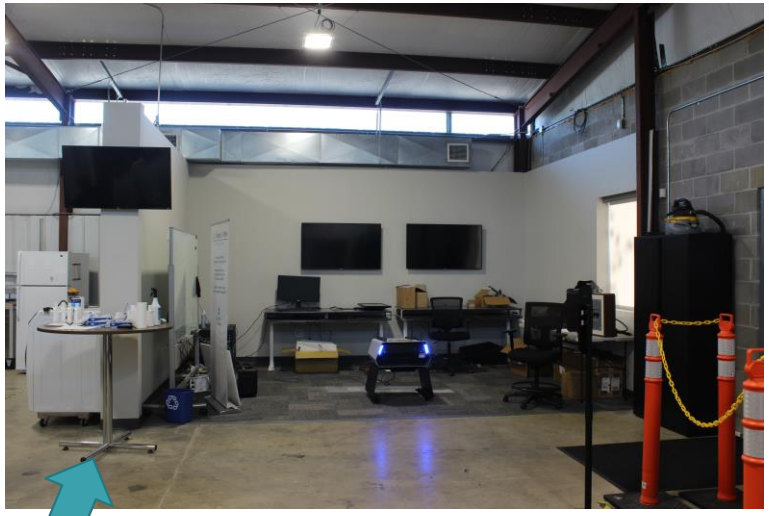
Technical Approach

- Leveraging R&D demonstration through GMLC partnership with ORNL
- Initial concept validated in GRID-C @ ORNL





Technical Approach



Home for SSPS Node

Protection and Control Lab

Commercial & Residential

V2X R&D

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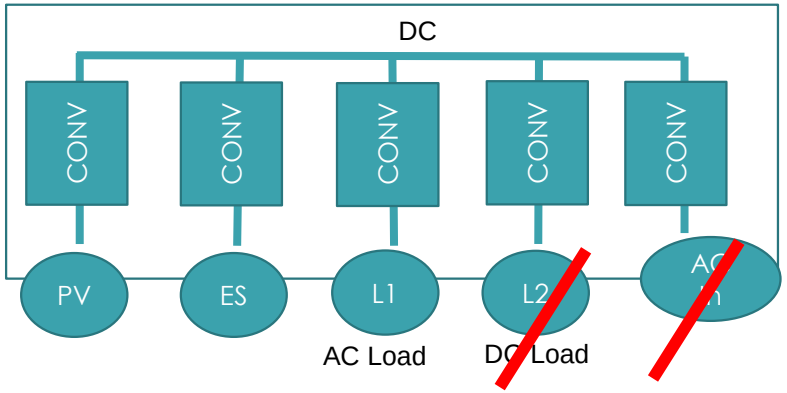
Technical Approach

Use Case #1: Resiliency

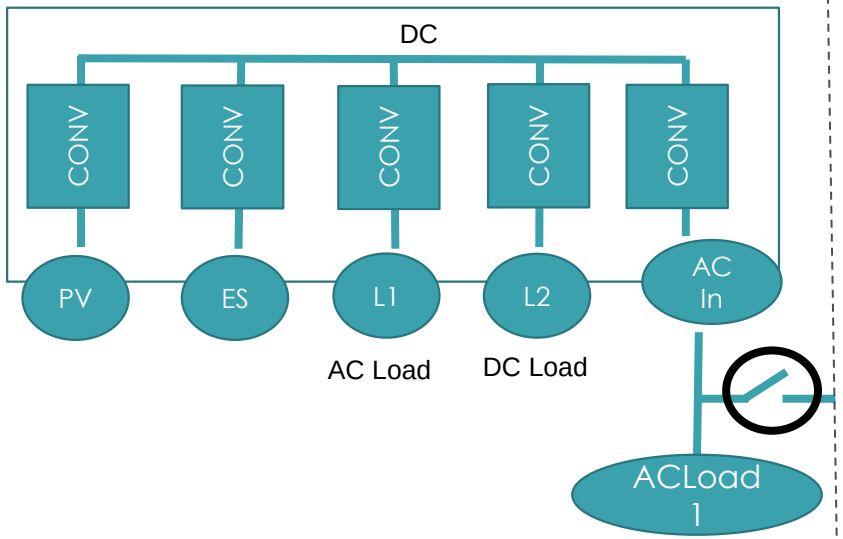
***Goal**: Maximum sustaining of a specified load (here, AC Panel)*



***Metric of Success:** A subset of lab sustains a maximum-hour, loss-of-grid event without initial interruption of operations*

Use Case #2: Reliability

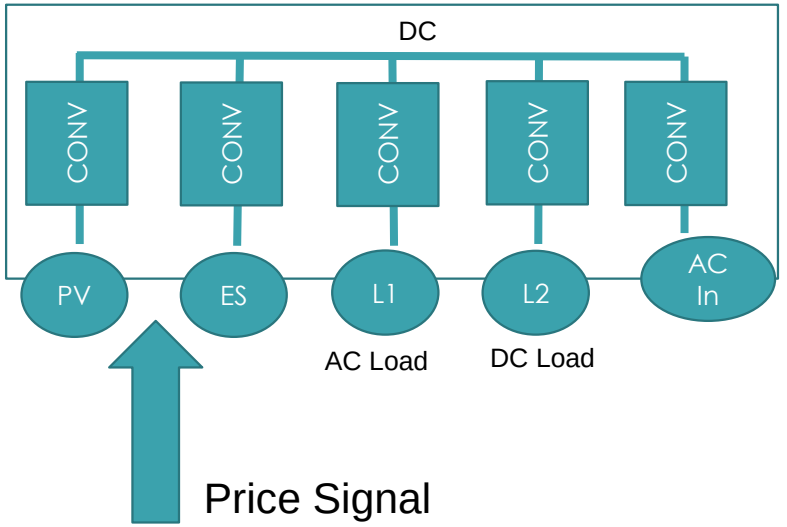
***Goal**: Support of entire load for an outage duration (including existing load on AC side)*



***Metric of Success:** Island entire facility load for 30 minutes and seamlessly resynch with the grid*

Use Case #3: Economic

***Goal**: Price signal optimization (price signal from utility, self optimization)*

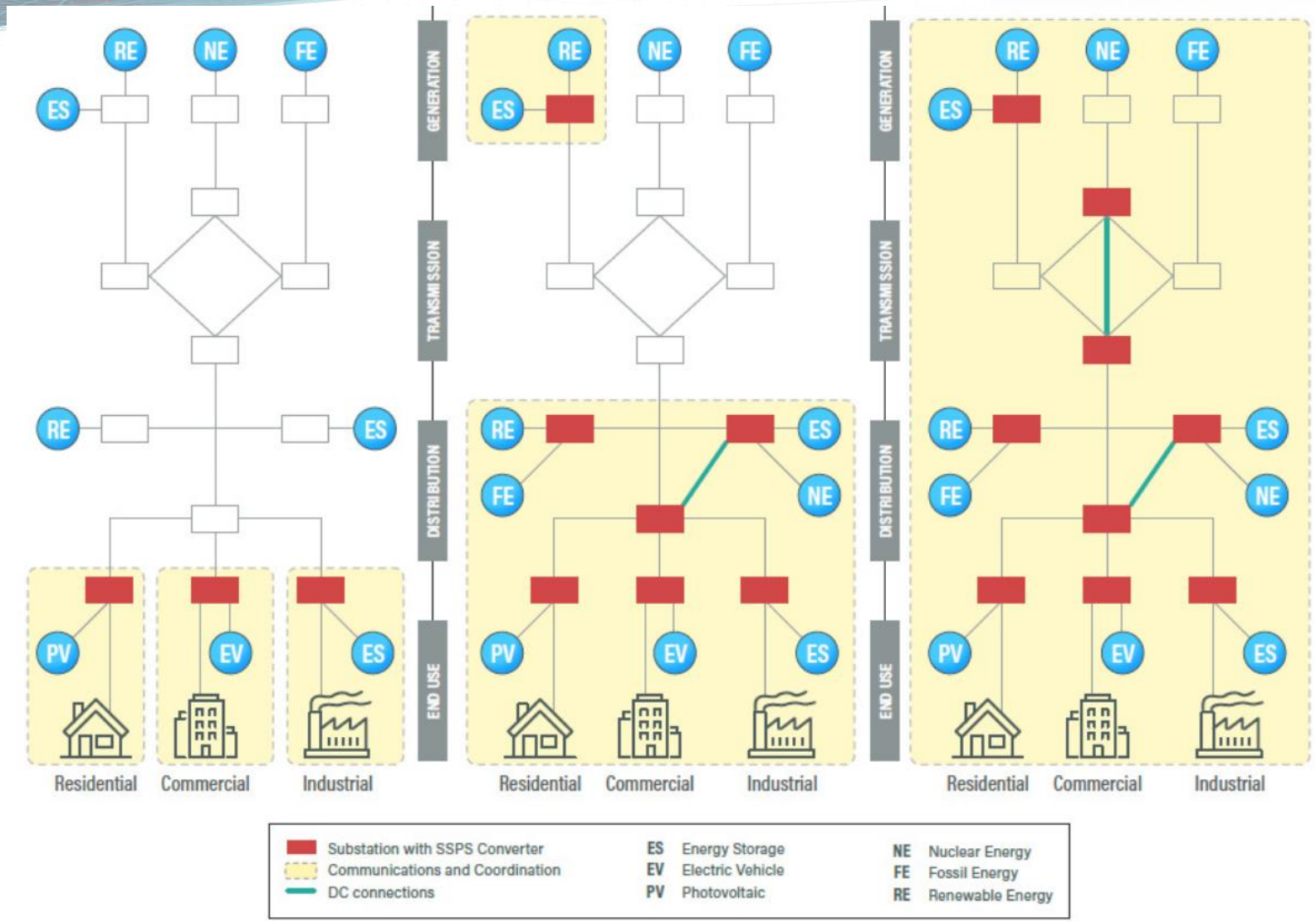


***Metric of Success:** The SSPS node successfully reduces the lab power bill by x% or $x/month, TBD*

Timeline

Milestone	Timing	Status
Project Kick-Off	November 2022	Complete
Goals & Use Case Prioritization	April 2023	Complete
Facility Design Document	December 2023	In-Progress
Implement Use-Cases via CHIL	December 2023	In-Progress

Future Work



Source: *Solid State Power Substation Technology Roadmap*. U.S. DOE Office of Electricity Transformer Resilience and Advanced Components (TRAC) Program. June, 2020.

THANK YOU

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