CSI RD&D Program #4 Grant

Advanced Distribution Analytic Services Enabling High PV Penetration

Coordination and IOU Outreach Meeting

June 26, 2014
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Project Overview

• Evaluate Circuit Impacts and Mitigation Strategies for Solar PV High Penetration
  – Representative Circuits
  – Native Capability
  – High Penetration
  – Mitigation Strategies
    • Infrastructure Improvements
    • Advanced Controls
    • Energy Storage
    • Demand Response

• Utilize Cloud-based Application - GridUnity
Leveraging Ongoing Work

**GENI - Green Electricity Network Integration:**
SCE is working with Caltech to test their distributed voltage and VAR control system. SCE is developing representative distribution circuits using GridLAB-D to evaluate the Caltech algorithms and determine the customer savings from advanced conservation voltage reduction.

**California Solar Initiative #3:**
SCE is working with EPRI and other partners to evaluate the Solar PV interconnection screening process for distribution feeders. Developing models and validating the analysis with field monitoring data.

**Electric Program Investment Charge (EPIC):**
SCE is working with Battelle to develop representative commercial and industrial models within GridLAB-D to evaluate optimized interconnection of distributed devices (e.g. Solar PV, Plug-in Electric Vehicles, Programmable Thermostats, Intelligent Inverters).
Project Partners

Provide GridUnity software to analyze impacts, communicate to stakeholders, and manage interconnection process.

Determine native Solar PV penetration levels for representative feeders and identify cost-effective mitigation strategies for higher levels of Solar PV.

Provide distribution model, interconnection process, validation of results, and demonstration of field interconnection.
Tasks and Deliverables

Setup Cloud Environment
- Determine data sharing procedures
- Setup environments
- Define user security
- Familiarize team with GridUnity

Prototypical Feeders and Native PV Levels
- Complete and validate prototypical feeders
- Map prototypical feeders to service area
- Review operational constraints
- Establish native PV levels

Mitigation Strategies & Generalized Approach
- Analyze mitigation strategies at various levels of Solar PV
- Develop generalized approach
- Validate generalized approach to detailed analysis
- Develop adjustment process

Operational Feeders Utilizing Methodology
- Engage third party participation
- Apply generalized approach to actual interconnections
- Evaluate field results
- Project closeout

Communication Outreach

June 2014
June 2015
June 2016
Prototypical Feeders

Setup
Cloud Environment

Prototypical Feeders
and Native PV Levels

Mitigation
Strategies &
Generalized
Approach

Operational Feeders
Utilizing Methodology

CSS
- Monthly kWh
- PRIZM Segments

Parcel Data
- Vintage
- Size
- Load Model

GridLAB-D

Adoption Models
- PV Adoption
- PEV Adoption

Cyme
- Circuit Model

Feeder Demand Validation
eDNA vs GridLAB-D

Leading the Way in Electricity™
Native PV

• Identify level of Solar PV penetration that does not exceed design and operational constraints (e.g. voltage, capacity, protection) for each Prototypical Feeder
• Validate GridUnity results to current tool analysis

Key Goal: Identify acceptable penetration levels for representative circuits for the entire SCE service area
Mitigation Strategies

- Determine cost-effective mitigation strategies for prototypical feeders at 50%, 75%, and 100% penetration
- Evaluate infrastructure improvements, advanced controls, storage, and demand response

Key Goal: Provide common approach for evaluating impacts across representative circuits to provide guidance to Solar PV developers
Field Validation

- Evaluate methodology in real world application
- Test application platform with Third party use of GridUnity
- Determine accuracy of generalized approach

Key Goal: Improve interconnection process and communication between utility and Solar PV developer
Project Objectives

• Decrease time and cost of interconnection studies while improving quality
  – Common platform to communicate approach and mitigation strategies
  – Streamline the process and improve the quality of interconnection applications

• Increase overall PV adoption rate
  – Better collaboration with key stakeholders through cloud-based platform
  – Provide cost guidance earlier to Solar PV development

• Develop cost-effective mitigation strategies
  – Standardize application of mitigation technologies across representative distribution feeders
Questions

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