Automatic AC Voltage Stabilization Using PV Inverter Control to Mitigate the Variability of Real Power from PV Sources and Improve Existing Power Quality on the Distribution System

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TECHNOLOGY SUMMARY

The proposed project will demonstrate the ability of a PV inverter, at near-zero marginal cost, to virtually eliminate voltage variation on a distribution feeder due to variation in the real power output of a PV plant, while mitigating the effects of load-induced voltage variations elsewhere on the feeder. Thus the PV inverter will mitigate the effect of its own variable real power output on the grid voltage by correcting changes while they are happening maintaining dynamic VAR reserve in a similar way as is done in modern transmission system VAR compensators. In parallel with the proposed fast VAR control, a slower supervisory control scheme will optimize the voltage profile of the entire feeder by periodically adjusting the nominal inverter voltage reference.

KEY PERSONNEL

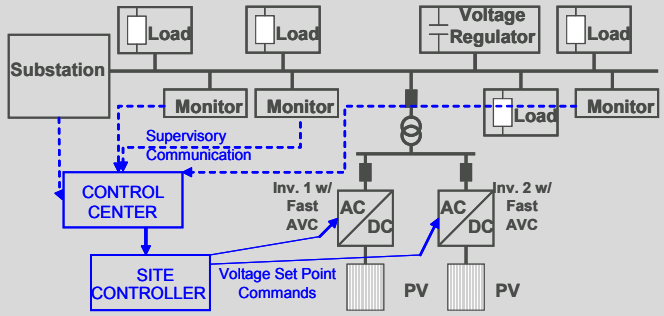
National Renewable Energy Lab (NREL), Sacramento Municipal Utility District (SMUD), Detroit Edison, Hawaii Electric Company (HECO), Lakeland Electric, NIST

PROGRAM SUMMARY

36 months

DOE funds:	$3M
Cost-share:	$2.7M
Total budget:	$5.7M

Key Milestones & Deliverables	
Year 1	• Designed, implemented, and conducted control board-in-the-loop testing of AVC technology
Year 2	• 1 MW and 500 kW Demonstration
Year 3	• Final Report and Presentation



System diagram of the proposed supervisory voltage control system

Technology Impact

Automatic Voltage Control (AVC) technology with the following capabilities:

- Voltage regulation with the ability to achieve steady state in one cycle
- No adverse interaction with other voltage regulators
- Cost neutrality and Standard grid-smart inverter capability

Main idea of proposed program

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