

# DOCKET

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Renewable Generation Challenges  
on SMUD's Distribution Systems

David L. Brown P.E.  
Principal Distribution System Engineer

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## Renewable Programs

- Net Metering
- Feed-In Tariff
- Utility Scale Projects

*We need more  
multi-family PV  
projects*



## Significant Interconnection Costs

- Connectivity
- Telemetry (SCADA  $\geq 1$  MW)
- Equipment operations impacts and offsite modifications



## SMUD Distribution System Interconnections

### Observations:

- Wherever the local load is well in excess of the generation few technical challenges arise.
- Distribution system reliability has not been degraded or improved by DG.
- Inverter based technologies have less impact on Voltage, Flicker, and Protection, compared to rotating machine (Synchronous, and Induction) generation.
- Substations with voltage regulators or LTC's are not compatible with reversed power flow, and DG is best limited to the substation's minimum load.
- DG's are rarely "beneficial" to the local distribution system.
  1. 40% of PV rated output is available at system peak
  2. Residential PV contributes little to the local peak (6-8PM)
- When a distribution system has connected all of the DG it can readily accommodate, a way of dealing with additional requests is needed.
- When Net-Metering targets are met, what happens next?



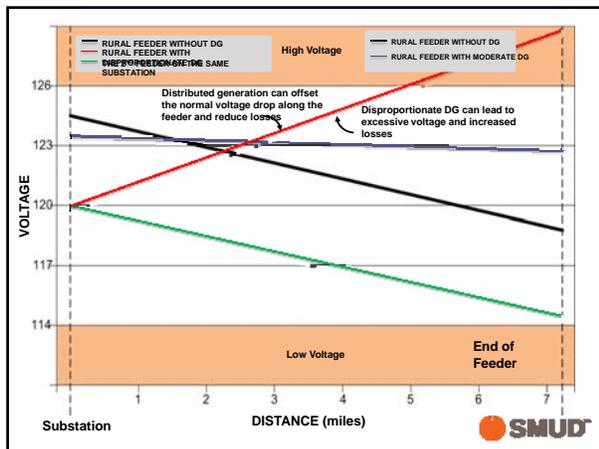
### SMUD Distribution System Interconnections

Mitigation:

- When a proposed DG becomes a tail that can wag the dog; find a bigger dog. The FIT program redirected numerous projects from 12kV connections to 69kV connections.
- Transfer Trip (substation Breaker – generator breaker) is a good solution for large projects but is too expensive for projects under 500kW
- When substation bus voltage regulation (LTC) cannot produce a voltage that meets the diverse needs of generation and load feeders, tapped transformers, capacitors and line regulators can be used to balance the voltage needs.
- Employing reverse power flow (or minimum import) relaying can avoid complicated relaying on non-exporting DG sites.
- Transferring load from adjacent feeders to avoid reverse power flows at the substation can be used in limited situations but is not a suitable long term solution
- Generator load following, and generation curtailments during low load periods can be used to alleviate reverse power flows where reliable communications is available. Load following batteries could help, as well.



### Questions?



### What is a Distribution System?

