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2011 IEPR Workshop On Localized Renewable Generation

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SVP – Power Supply

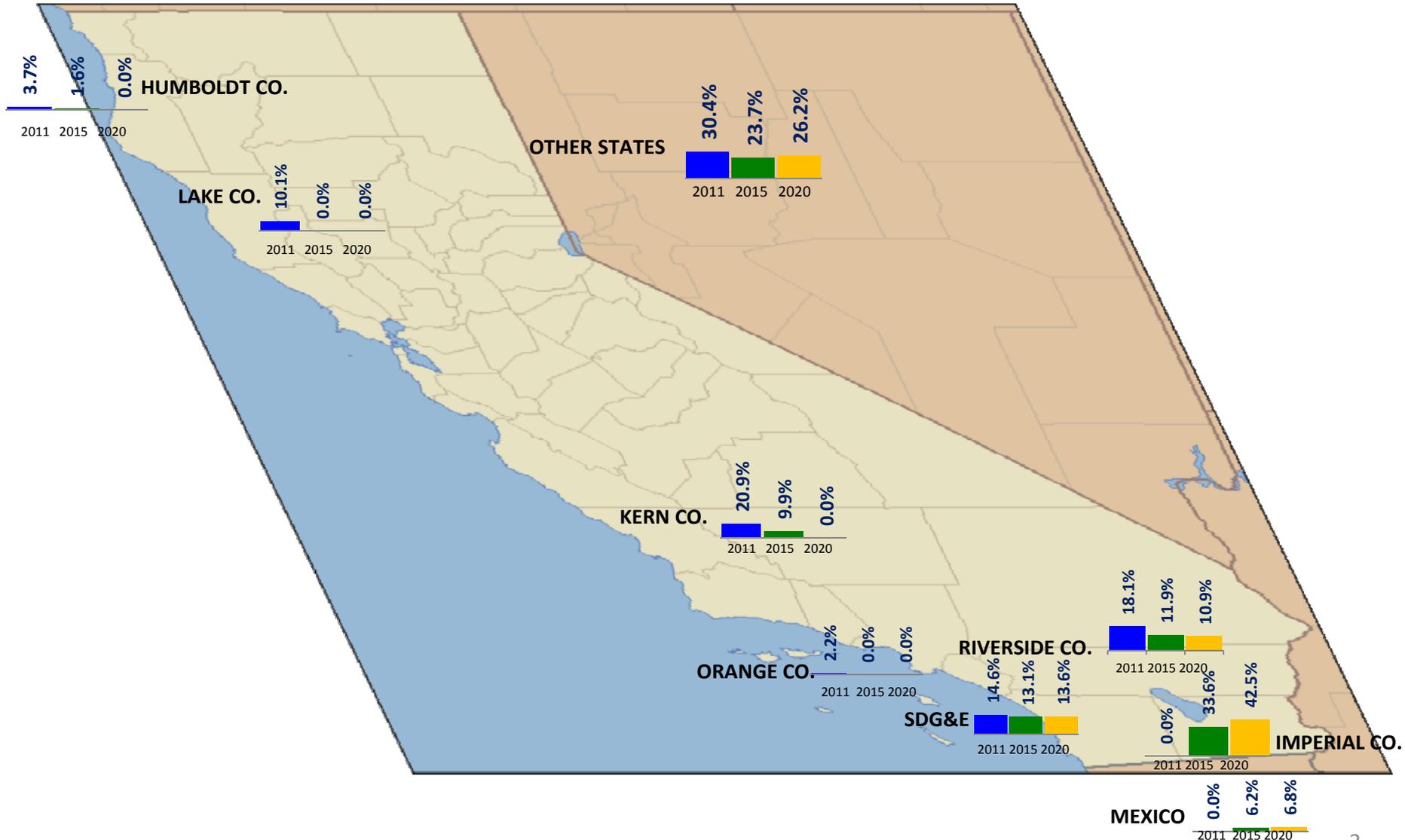
San Diego Gas and Electric Co.

Distributed Generation

Should be Driven by Least Cost/Best Fit Principles

- SDG&E adds resource based on the State's preferred loading order
 - First preference for energy efficiency and demand response
 - Total renewable power could reach 40%
 - Renewable Portfolio Standard: 33%
 - Renewable Portfolio Standard Planning Cushion: 5-2%
 - Net Metering (5% of Peak) 2%
- Maintaining reliability at a 33% RPS will require resources with operational flexibility

RPS Portfolio by Location: current reliance on central & northern CA is replaced by projects mainly in Imperial Valley



Transmission System Issues

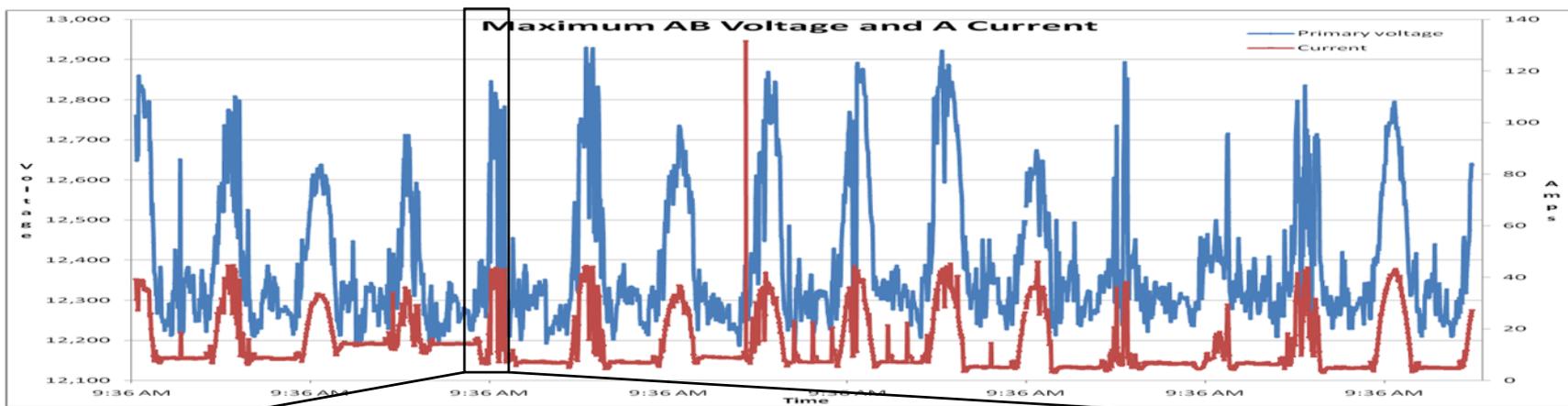
- With 2000 MW of DG on a low load day, the transmission system exhibited:
 - High voltage conditions - 10% above nominal
 - North of SONGS flows exceeding limits by 500 MW
 - Transient stability problems
- Potential Required Transmission Upgrades
 - Synchronous condensers and shunt reactors (\$230 – \$300 million)
 - Flow control device to prevent excessive North of SONGS path flows (\$100 to \$250 Million)
- Local Furnishing Bonds
 - SDG&E has approximately \$700 million of Industrial Development Bonds that must be redeemed if SDG&E builds facilities beyond what is needed for its bundled customers
 - FERC must issue a Federal Power Act Section 211/213 order to Protect tax-exempt status of interest on bonds
 - Rule 21 process cannot legally protect tax-exempt status



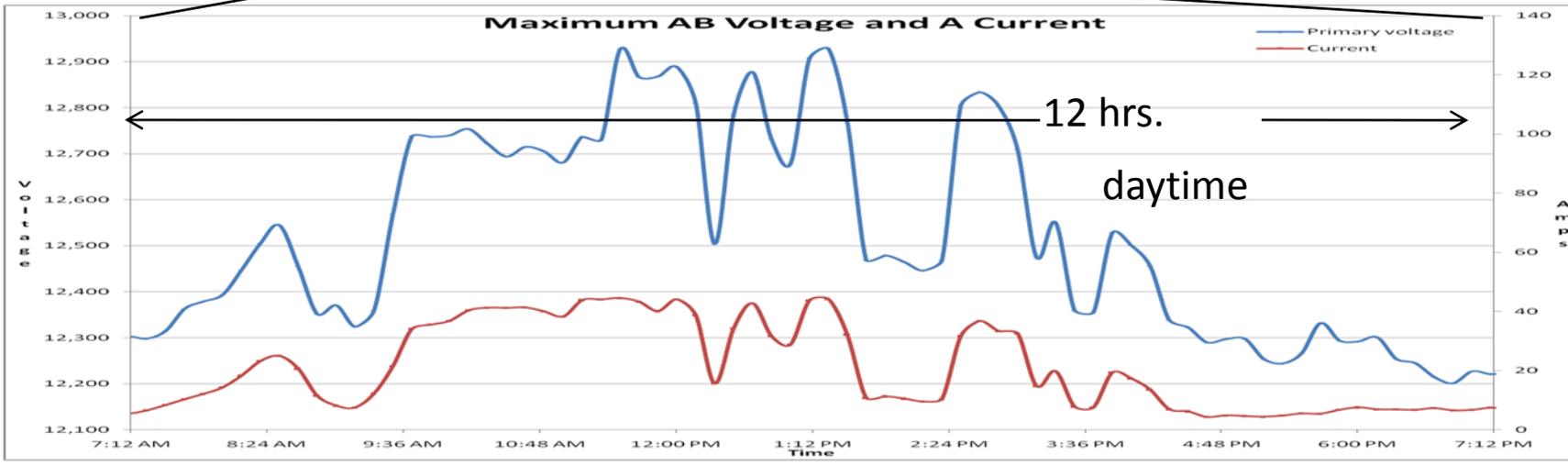
Typical PV Intermittency SDG&E DG Causes Resource Forecasting Problems on a Daily Basis

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Daily PV Generation (2/23 - 3/10, 2010)



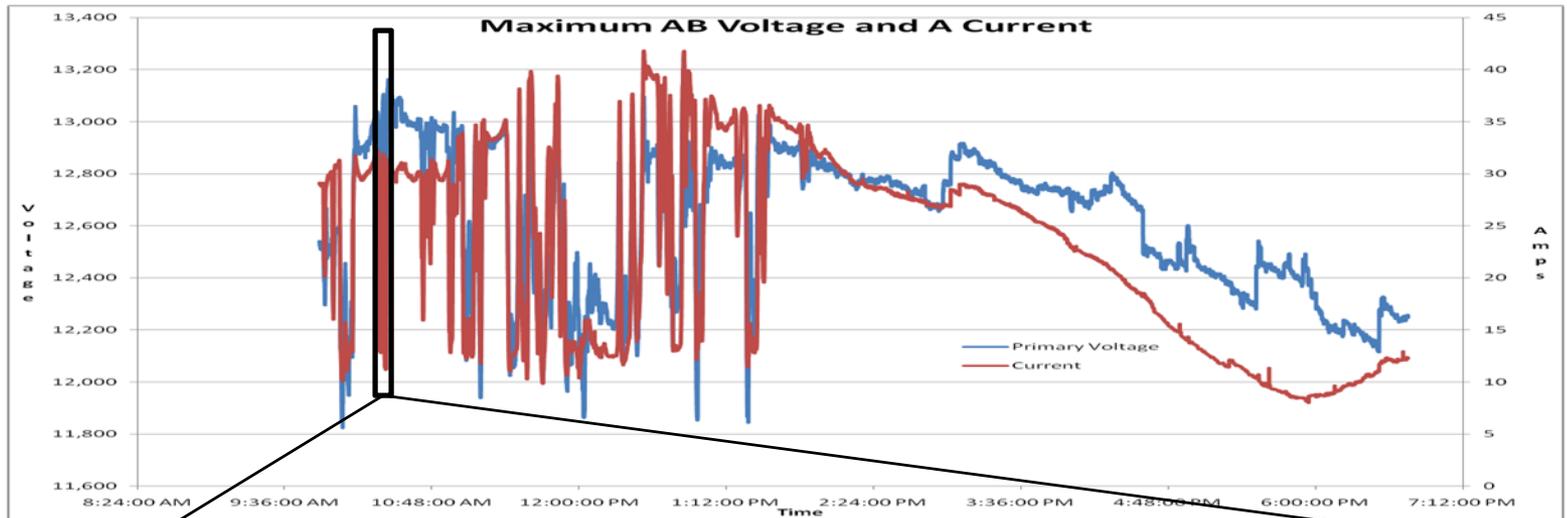
Variability within a typical day (2/28/10)



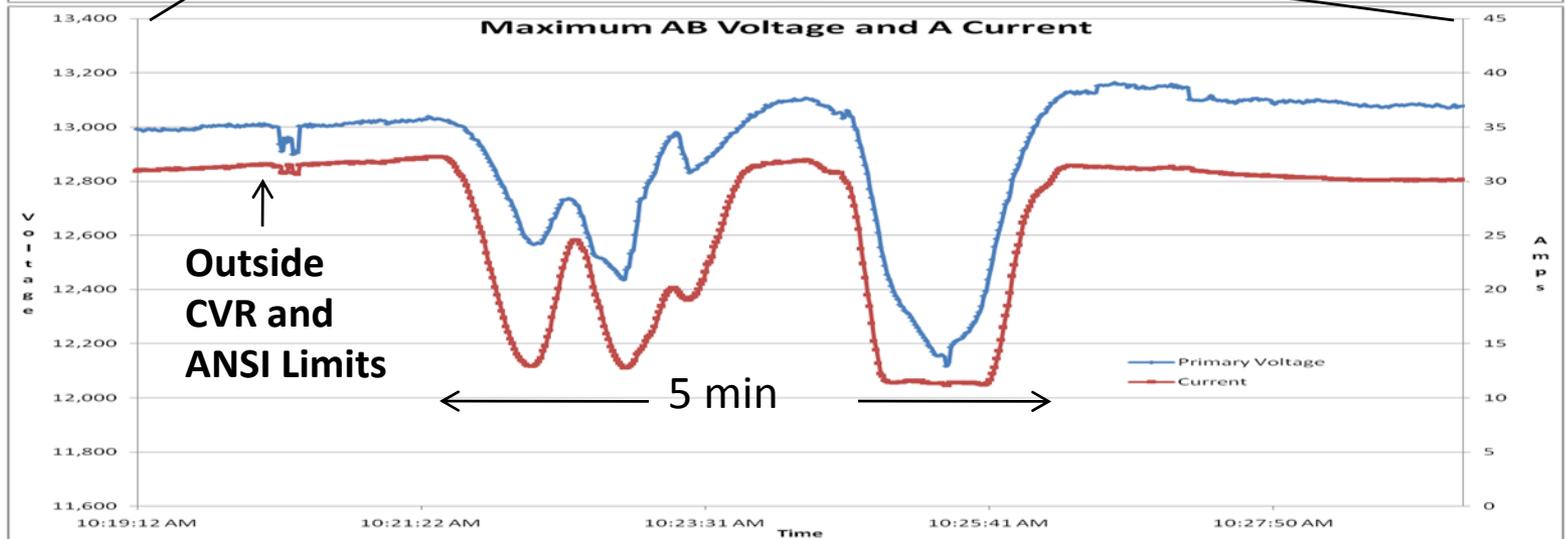
Each data point recorded at 10 min intervals

Voltage Regulation Problems and Reduced System Efficiency and Increased Operational Cost Caused by Intermittency of PV

One Typical Day (5/11/10)



Snapshot of one 5min period



Data recorded in intervals of 1 second