Hawaiian Electric Company, Inc.
Maui Electric Company, Ltd.
Hawaii Electric Light Co., Inc.

Operational Challenges with Variable Generating Resources

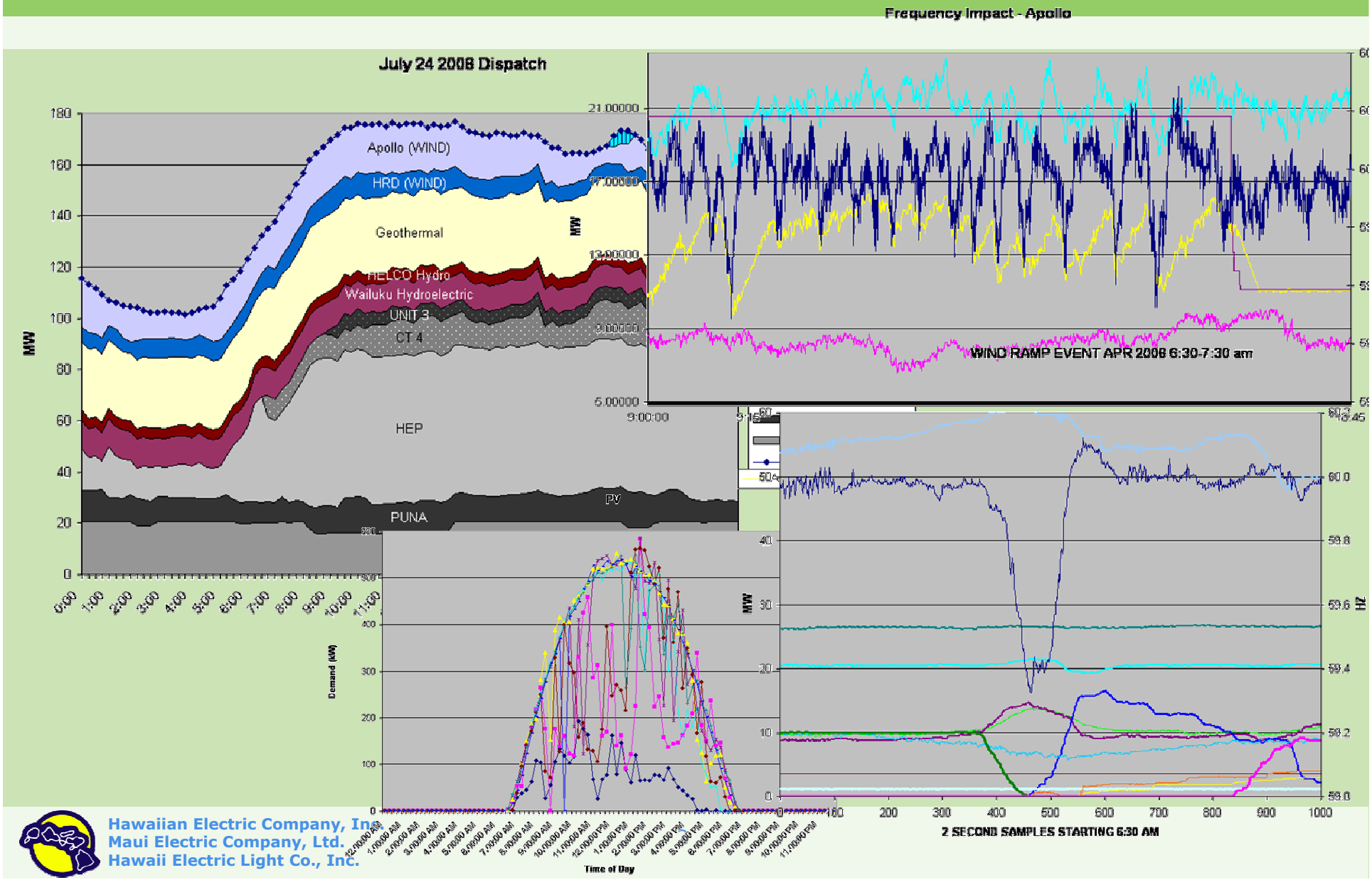
2009 Western Conference of Public Utilities Commissioners

June 8, 2009

Leon Roose, Manager, System Integration

Shari Ishikawa, Operations Supt.

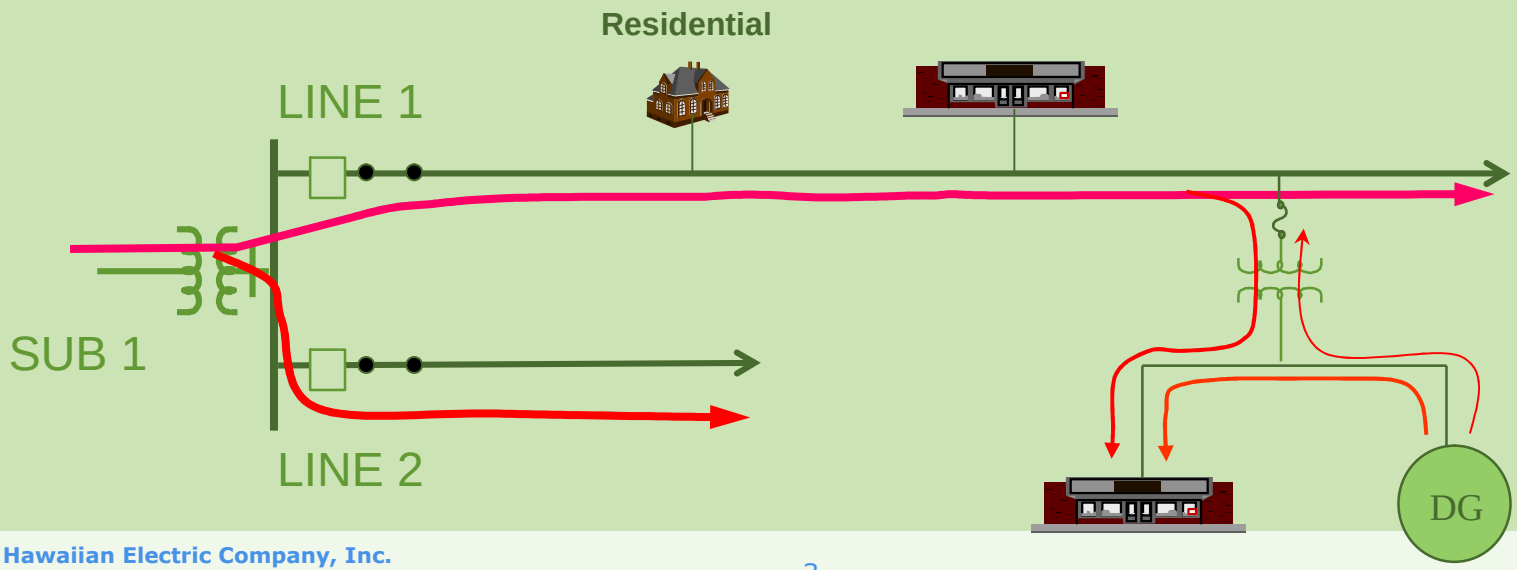
Physical Constraints on the Grid



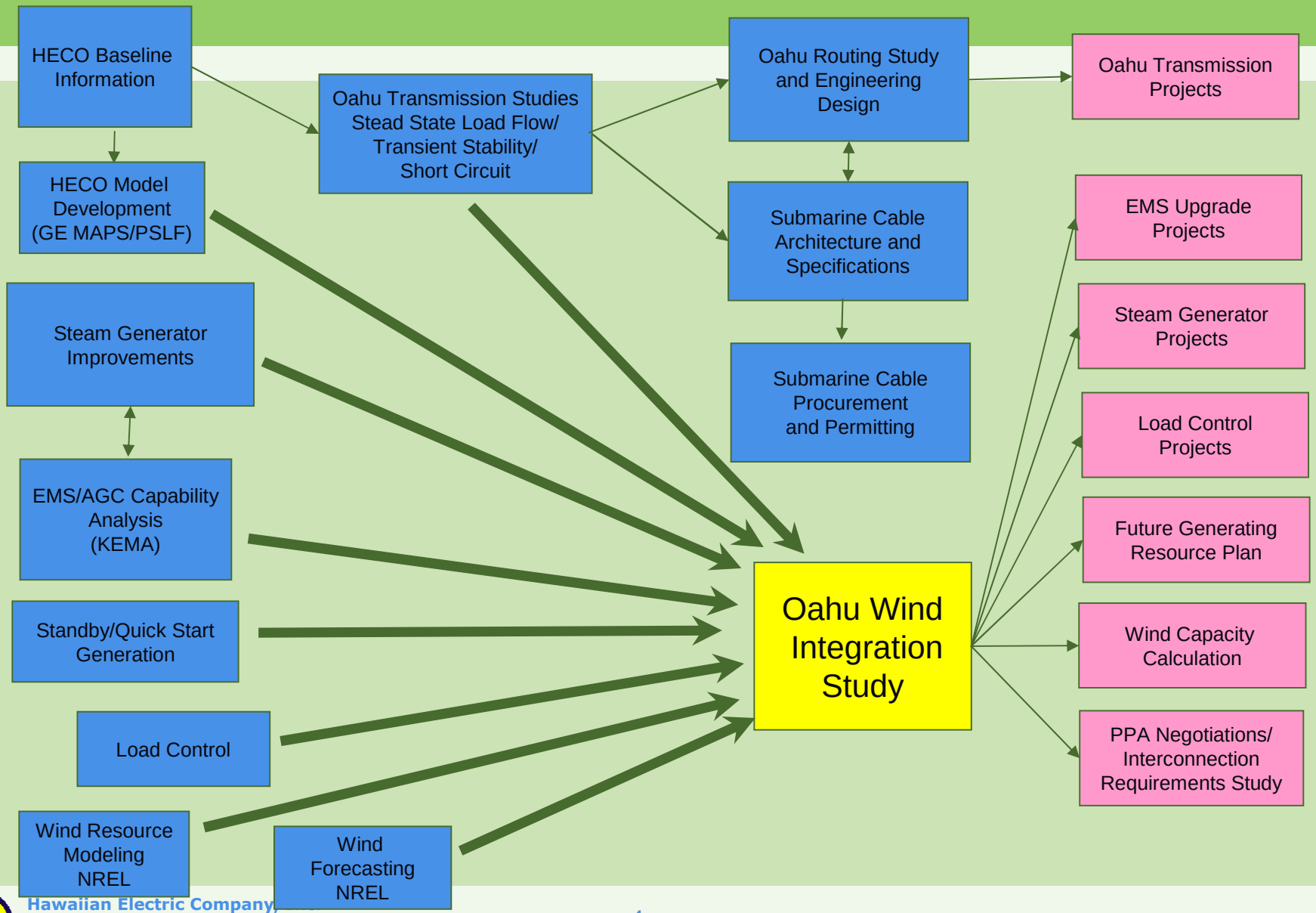
Hawaiian Electric Company, Inc.
Maui Electric Company, Ltd.
Hawaii Electric Light Co., Inc.

Distributed Variable Renewable Generation

- Protection Schemes on Distribution Systems
  - Fault current and relay settings (1way-2way flow)
  - Anti-islanding
  - IEEE 1547 settings
- Voltage Regulation
- Excess Energy Issues/Visibility of DG



Balancing Variable Generation



- Questions?