Hawaiian Electric Company, Inc.

Hawaii Solar Activities IMPACTS 2030

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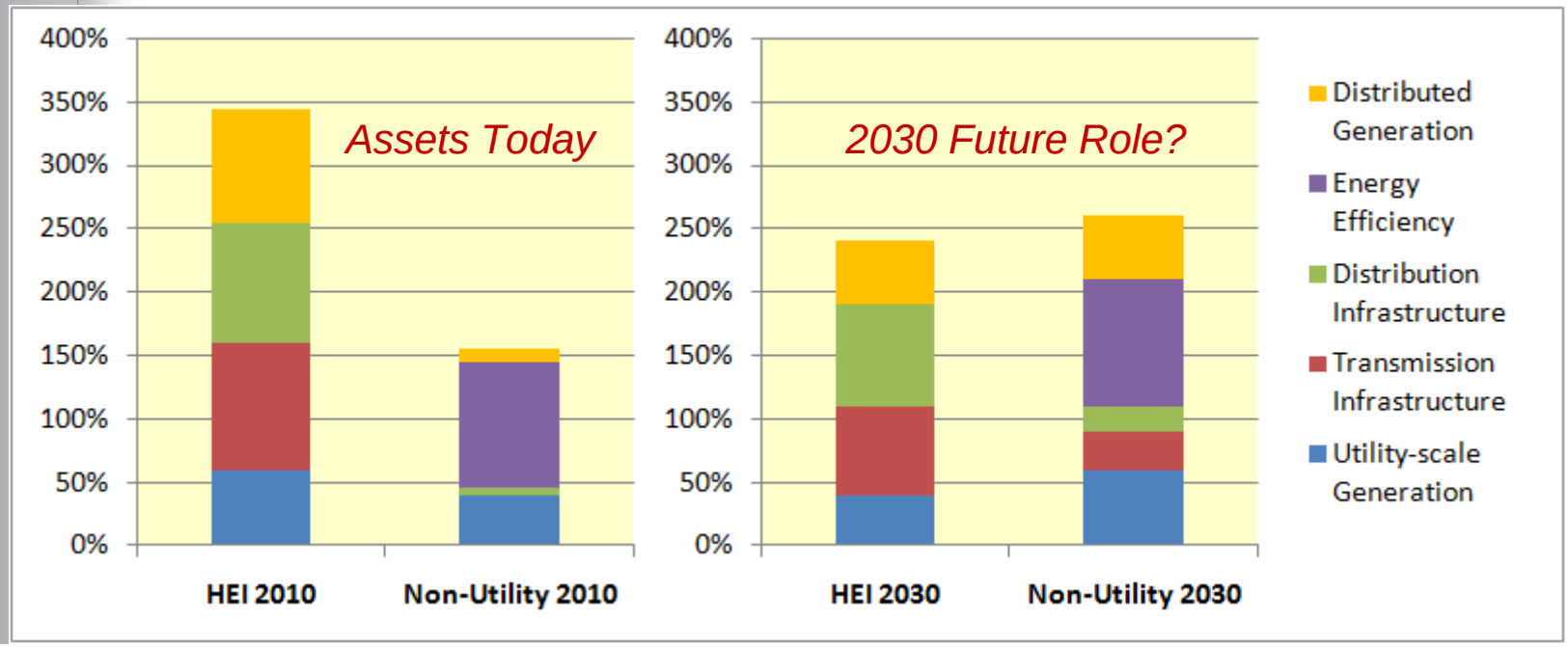
Hawaiian Electric Company

UWIG April 14, 2010
Portland, OR

Policy Drivers & Transformational Change

- Game changing inter-island cable system (2014-2020)
- Aggressive RPS Targets (HB 1464): 2010 -10%, 2015-15%, 2020-25% and 2030-40%
- 4,300 GWh energy efficiency targets
- Explosion of distributed generation through NEM / SIA / FIT /...PHEV...others
- Future? - Ancillary services - Reserve market



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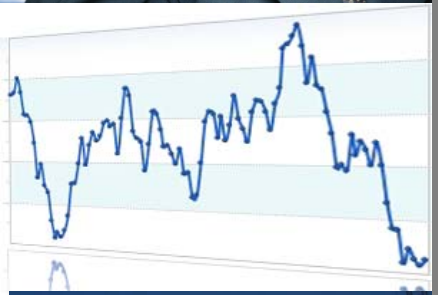
Changing Utility World & Role

- System planning for bi-directional flow with increasing levels of distributed generation
- New data & tools for planning, operations, workforce development and customer interface (more data & visualization interfaces)
- New communication infrastructure and operational data handling practices for accommodating increasing “as-available” resources
- New Variable Management Strategy (VMS) and infrastructure offering grid-friendly support and fast starting capabilities
- Vigilant monitoring of interdependent infrastructures for impacts and unintended consequences



Gap Analysis – Pathways Forward

What will we need to successfully operate in 2030?

2010 Today → 2030 Future

Field Monitoring & Validation

- Renewable resource characterization & monitoring
- Distributed resource penetration monitoring & mgt (LVM on FIT/NEM…)

Integrated Syst. Modeling

- Use appropriate renewable resource gen/trans/DG models
- Interface DG & Transmission Planning models
- Incorporate "as-availables" in resource plans
- Investigate & integ. variability mgt options (storage)

Increase Visibility on Sys.

- Increase Sys Ops visibility to real time system (PMU) & res.
- Add DG resource visibility to Sys Ops
- Operationalize Wind & Solar ramp forecasting tool
- Com. bandwidth for visualization tools

New Business Process/Mindset

- Couple customer & program usage trends & DG circuit penetration data
- Assess grid service-based performance for res. scheduling
- Workforce retooling , experience & development of on-island workforce pipeline

Funded/Initiated

Have Not Initiated

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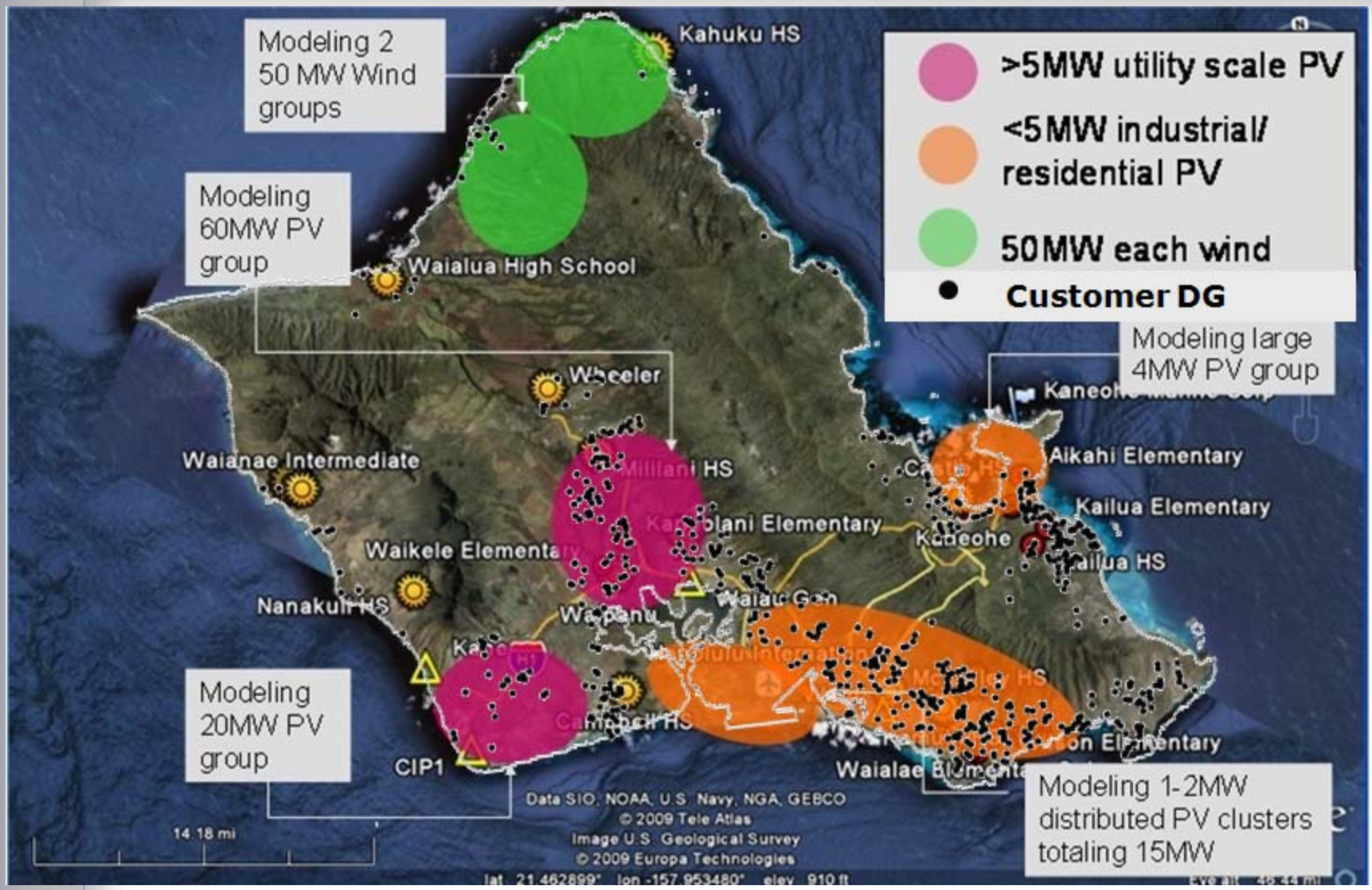
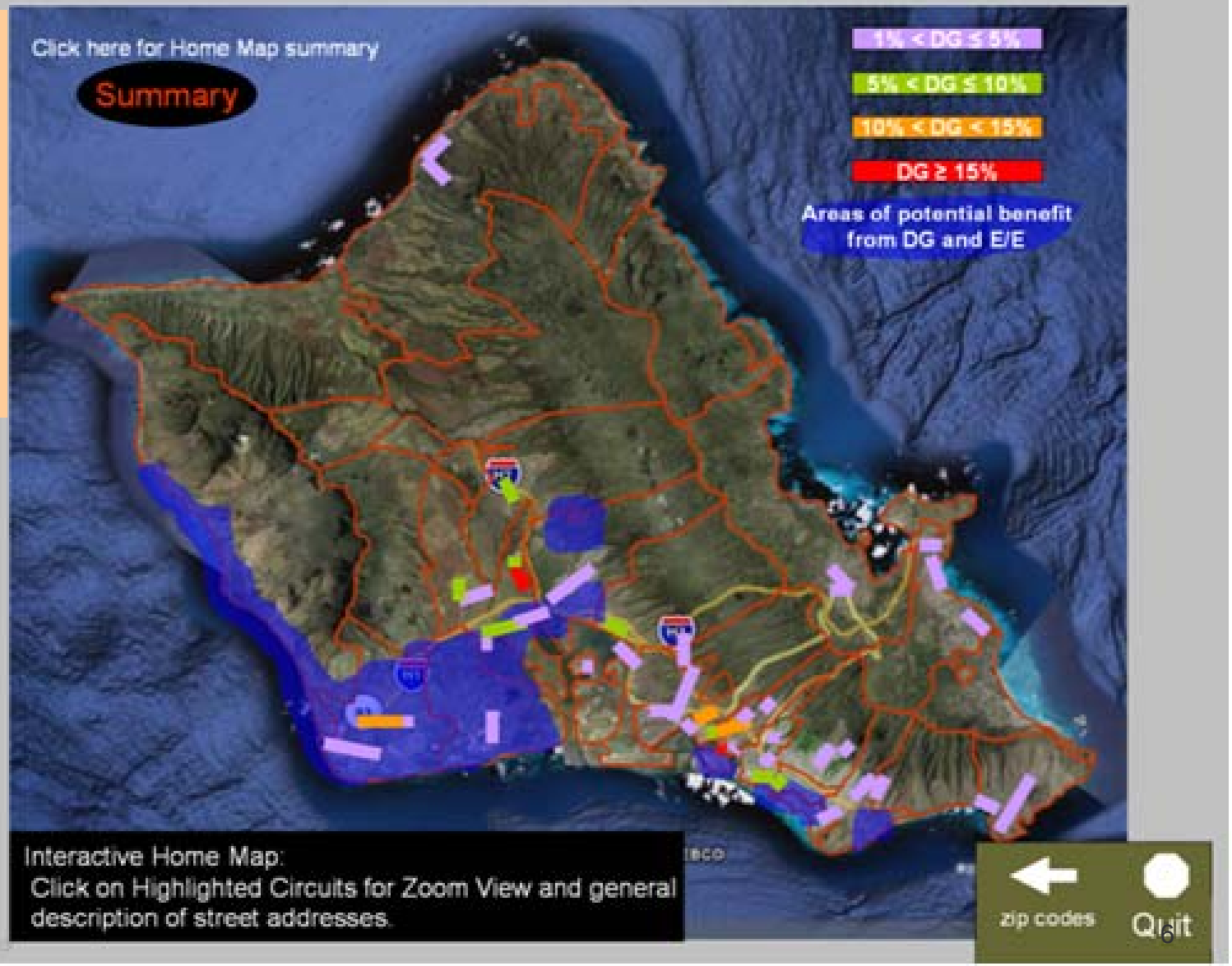
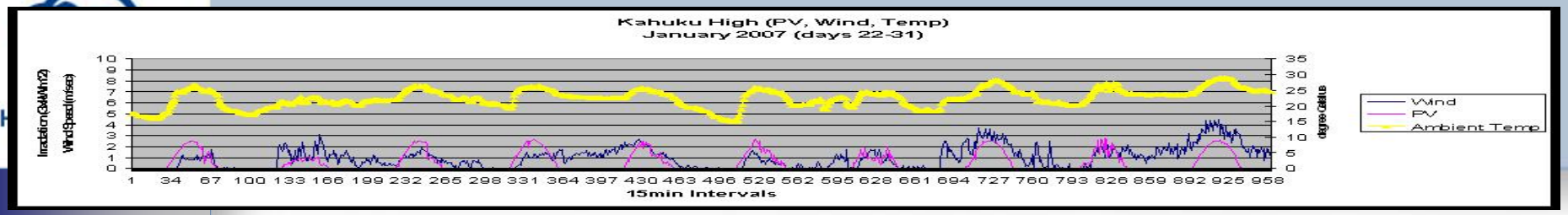
Characterizing Resources in Relation to Customer Impacts

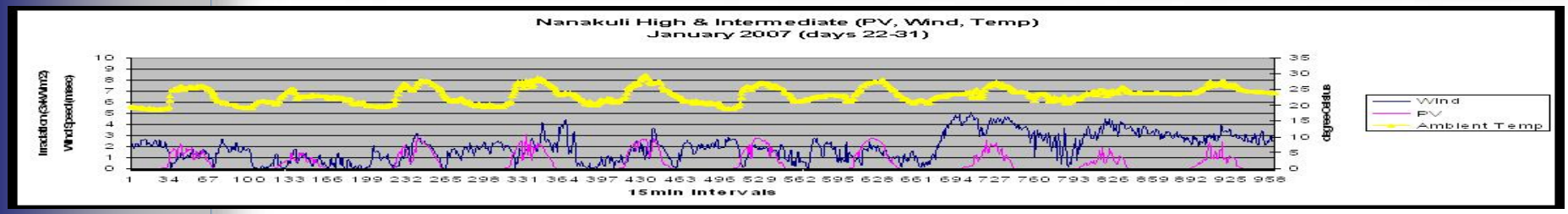


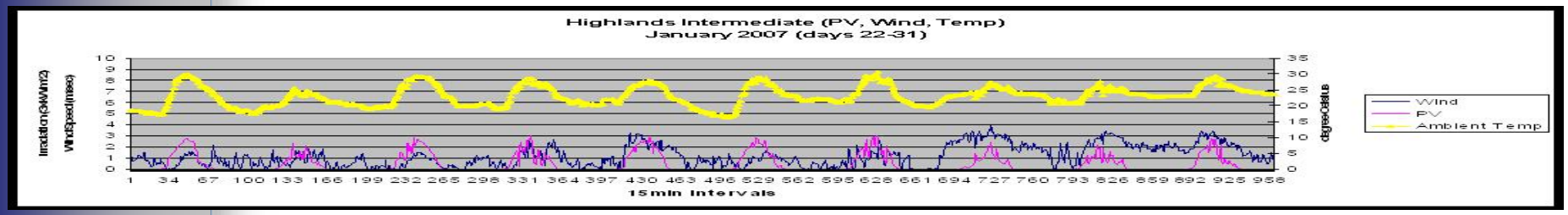
Value of Distributed Solar

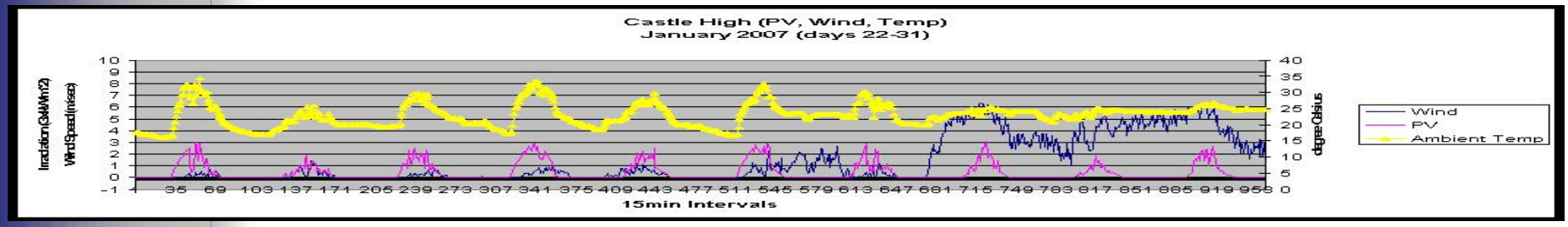
LVM to track high penetration areas and provide developers heads up

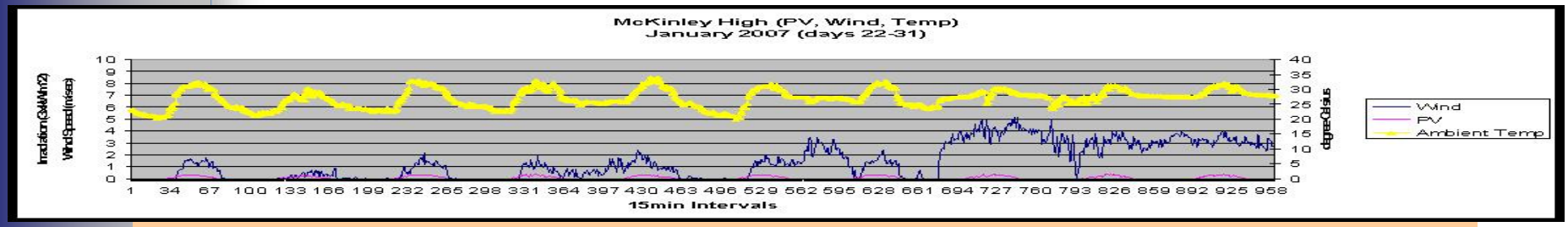












Assess historical record of PV & wind resource across the island

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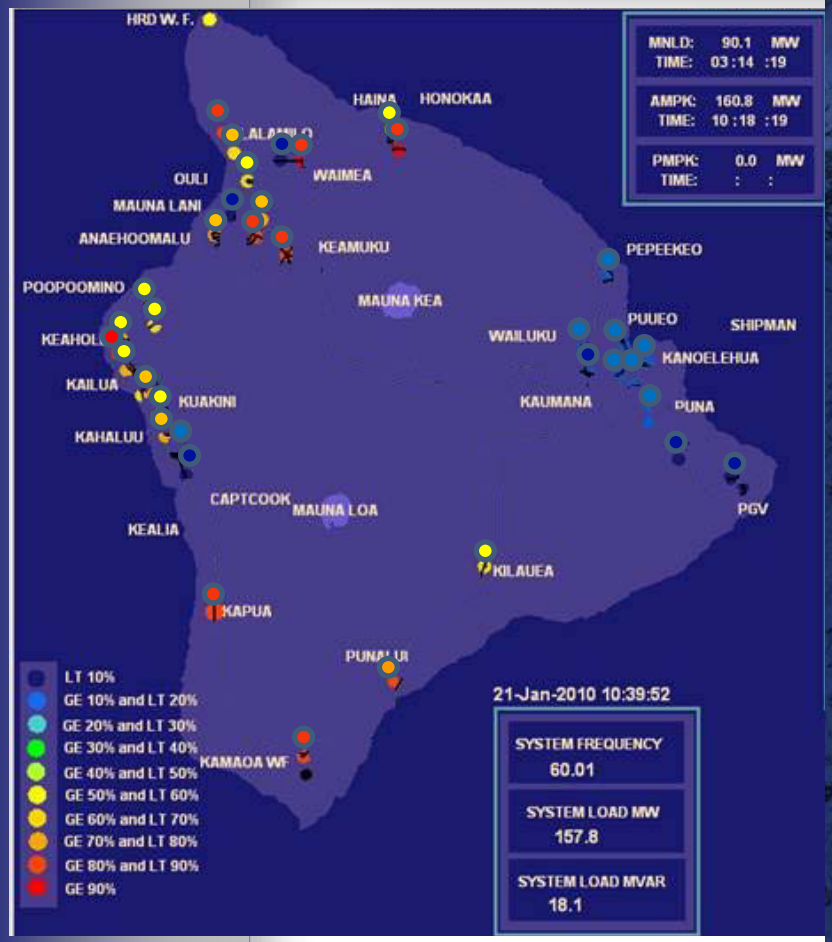
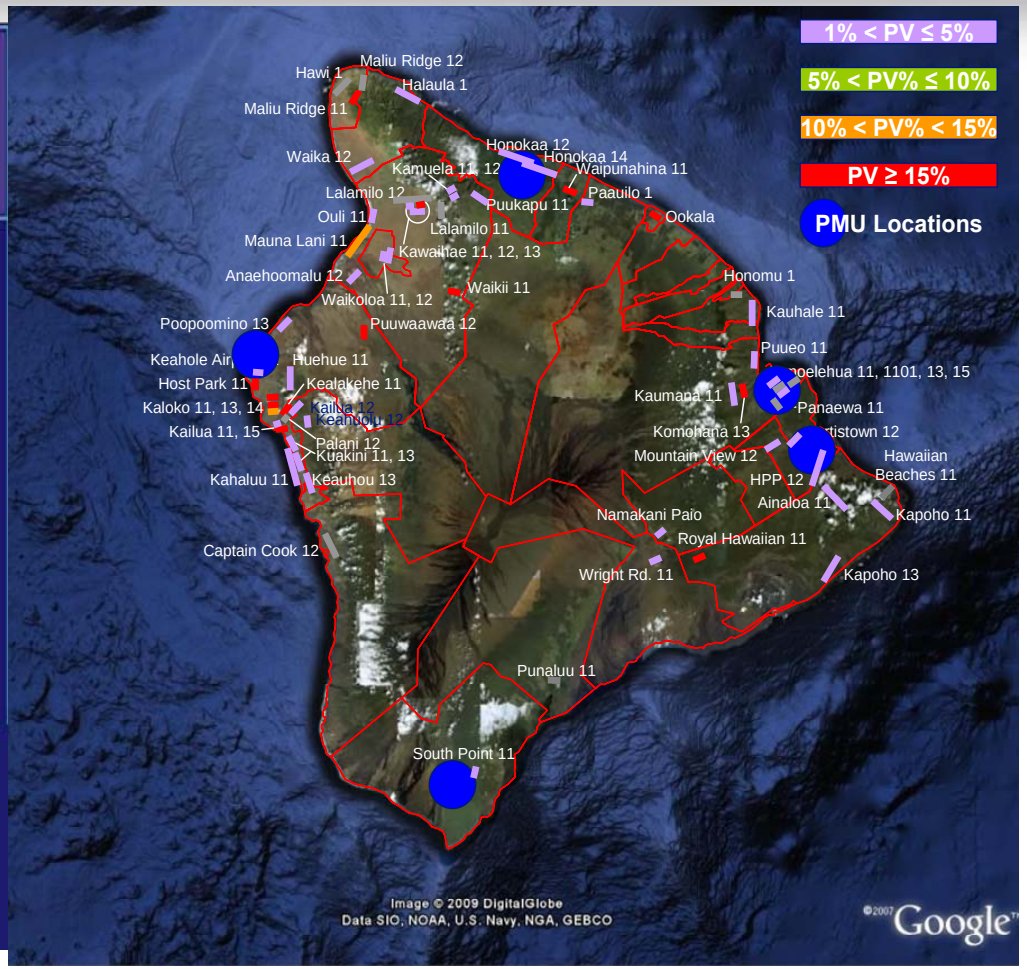
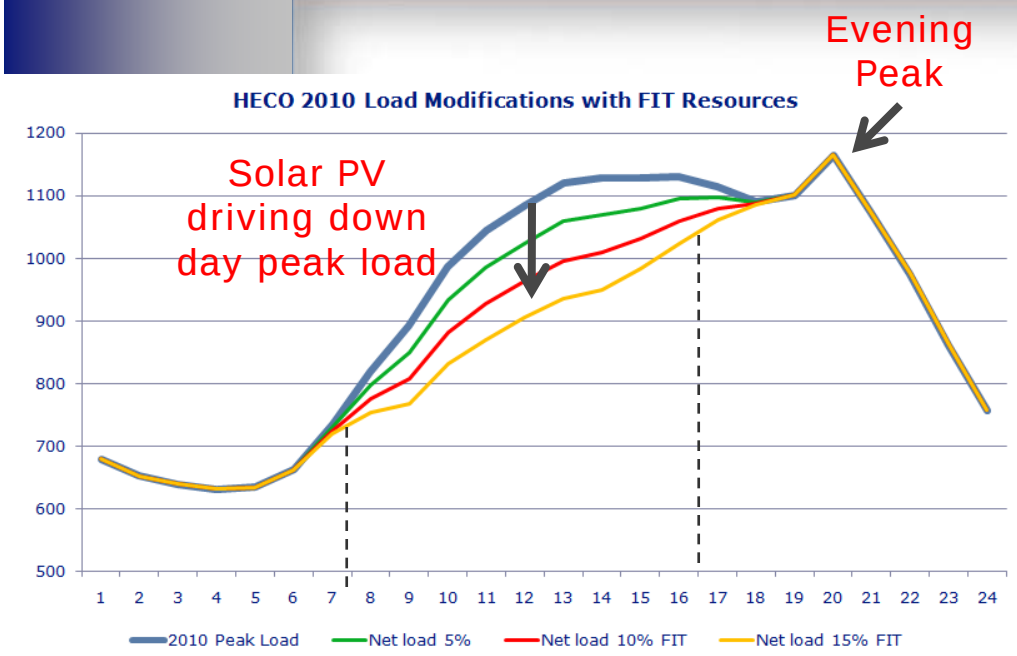
Visualization & Data Monitoring

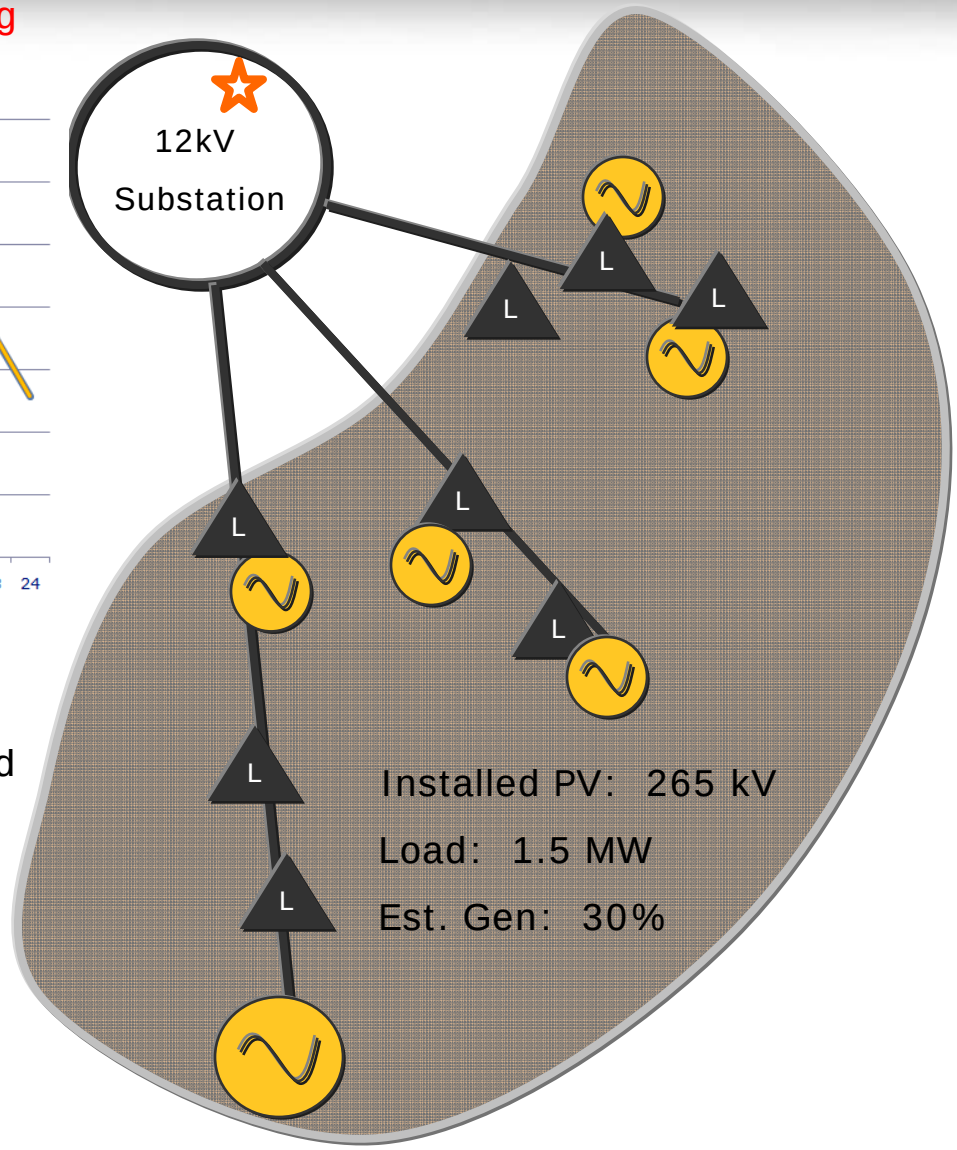




Ability to anticipate production on the system by linking solar resource information with installed capacity around the island

Visually Track Availability & Impact of DG PV

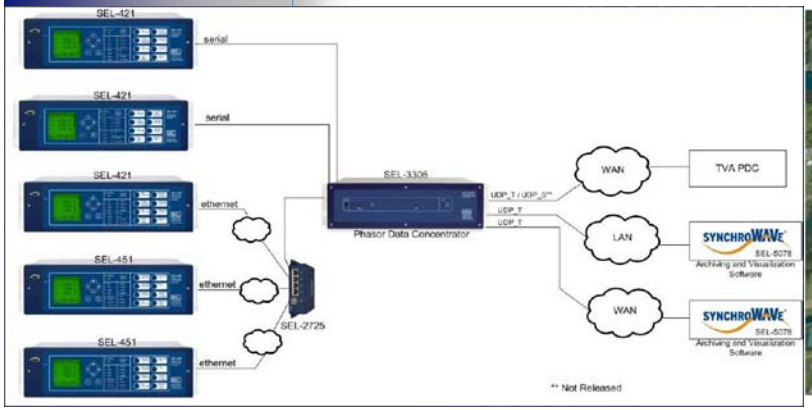


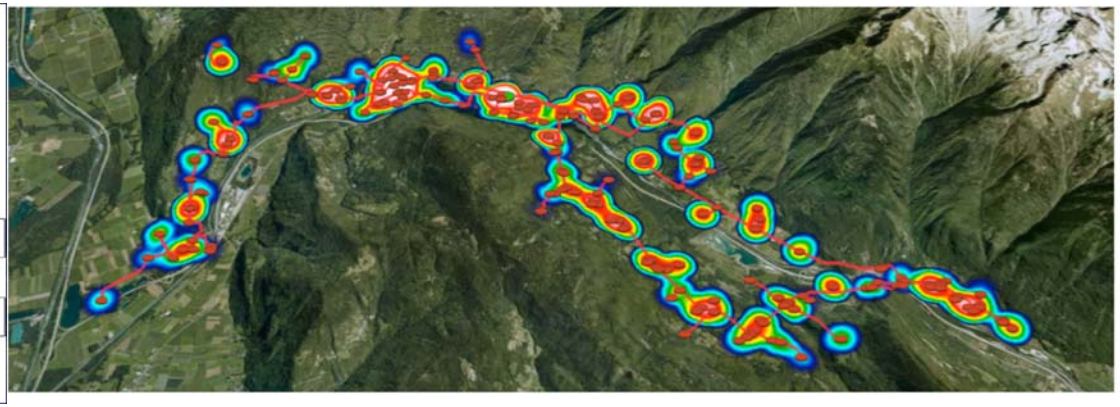


- Aggregate distribution feeder load as 3-phase equivalent load at substation
- Roll up from 12kv to 46kv linking T&D models
- Overlay circuit load and estimated kWh generated from installed PV based on solar resource monitored

Hi-Penetration PV Initiative (HiP PV)

- SMUD/HECO HiP-PV – (2010-2012)
  - Use models to assess impact of high penetration PV on select distribution circuits (HECO/HELCO)
  - Investigate solar forecasting & visualization tools (pyranometers, total sky imager)
  - Deployment of PMUs and gather system level information and impacts
- Industry Partnerships
  - SMUD, SunPower, BEW Engineering, AREVA, Siemens, Schweitzer, SunPower for Schools, WECC, CaISO, SCE, PG&E, HNEI, AWS Truewind





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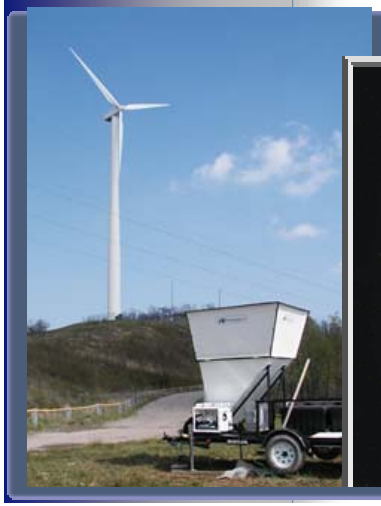
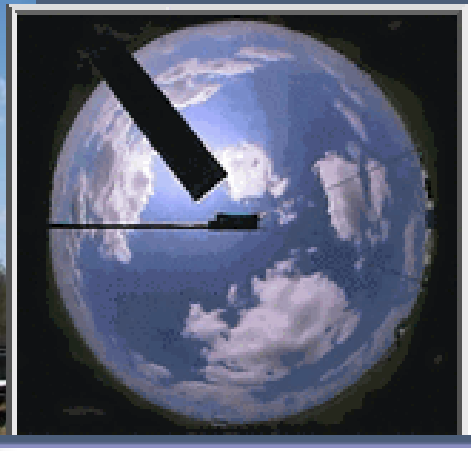
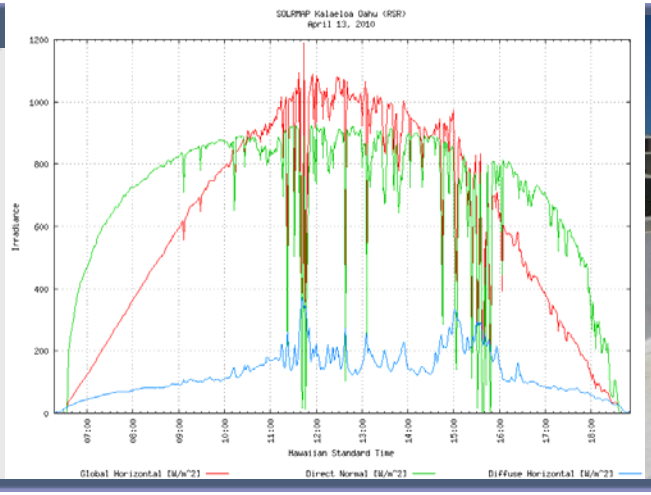
Collaborations

- NREL (Resource characterization)
  - High resolution solar resource monitoring/characterization & PV array modeling
  - High resolution wind resource modeling
  - Single circuit PV penetration analysis & modeling
- PNNL (PMU/synchro-phasor data & analysis)
  - PMU/synchro-phasor program
  - MECO Field deployment & analysis
- SNL (Intermittency Management Strategy & Models)
- LLNL/INL (Critical assets & interdependencies)







Questions/Comments??

Mahalo

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