USMC Okinawa Energy Demonstration Scoping Project

Out Brief
March 3, 2017

GridSTART
Hawai'i Natural Energy Institute | University of Hawai'i

Grid System Technologies Advanced Research Team

HNEI
Hawai'i Natural Energy Institute
School of Ocean and Earth Science and Technology
University of Hawai'i at Mānoa

UNIVERSITY of HAWAI'I
MĀNOA

Scope Development Process

- Task 1 – Identify and prioritize 4 - 5 candidate project locations and associated demonstration concepts and objectives.
- Task 2 – Survey 4 - 5 candidate project locations/concepts and obtain initial site/facility data to assess needs/opportunities and revise prioritization and select top 2 – 3 candidate demonstration projects for next phase scoping and assessment.
- Task 3 – Develop conceptual level demonstration project scope and refined objectives for the top 2 - 3 most promising candidate locations.
- Task 4 – Assess the benefits and costs and feasibility of the selected candidate locations and select the top 1 – 2 demonstration projects for detailed planning
- Task 5 – Develop implementation plan(s) and recommendation for final demonstration scope, budget and schedule.

Selected Demonstration Scopes

Jungle Warfare Training Area (JWTC) – Main Compound

- Renewable energy / microgrid demonstration

Foster Plaza Housing

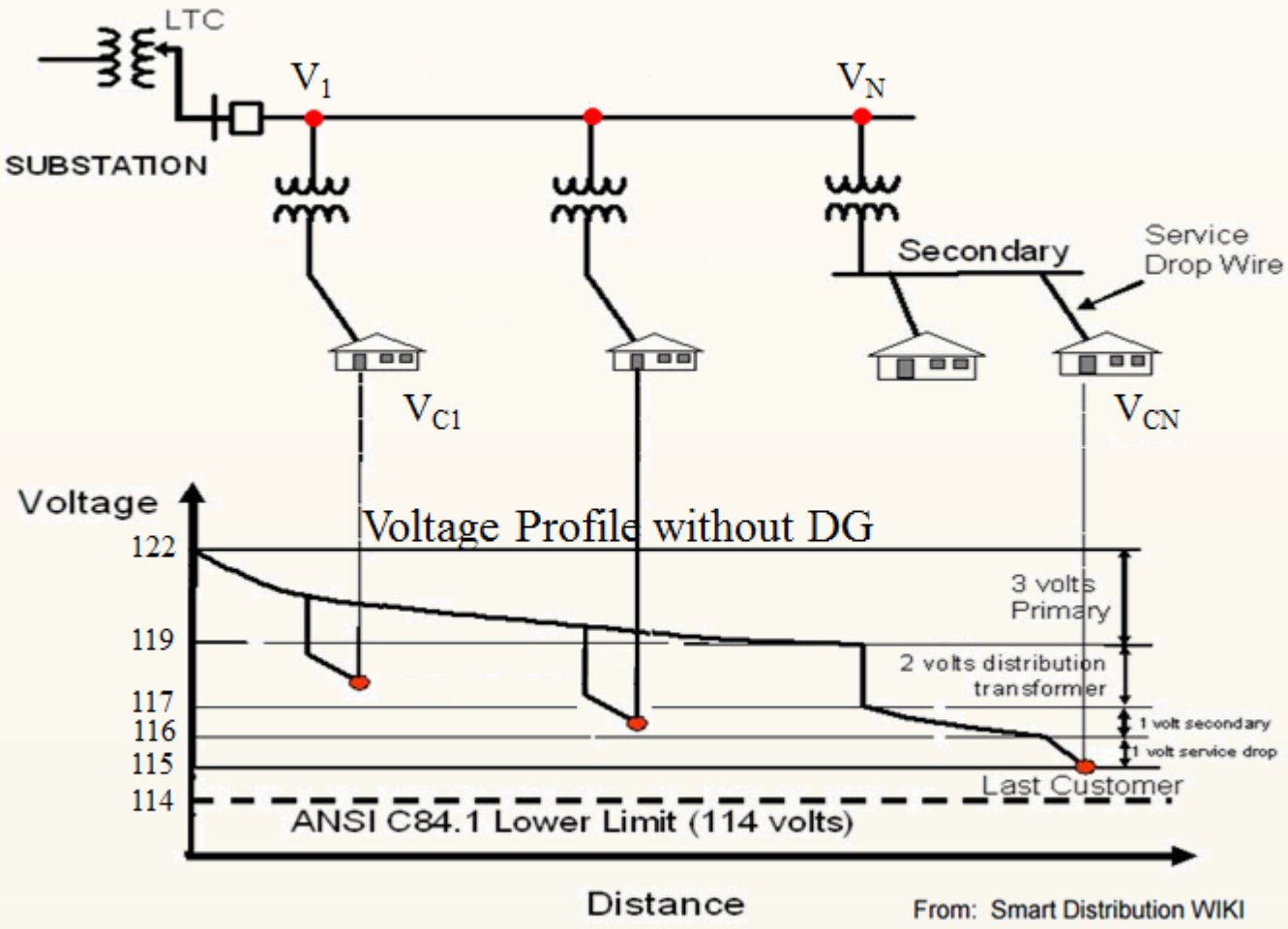
- Conservation voltage reduction demonstration

How does CVR Work?

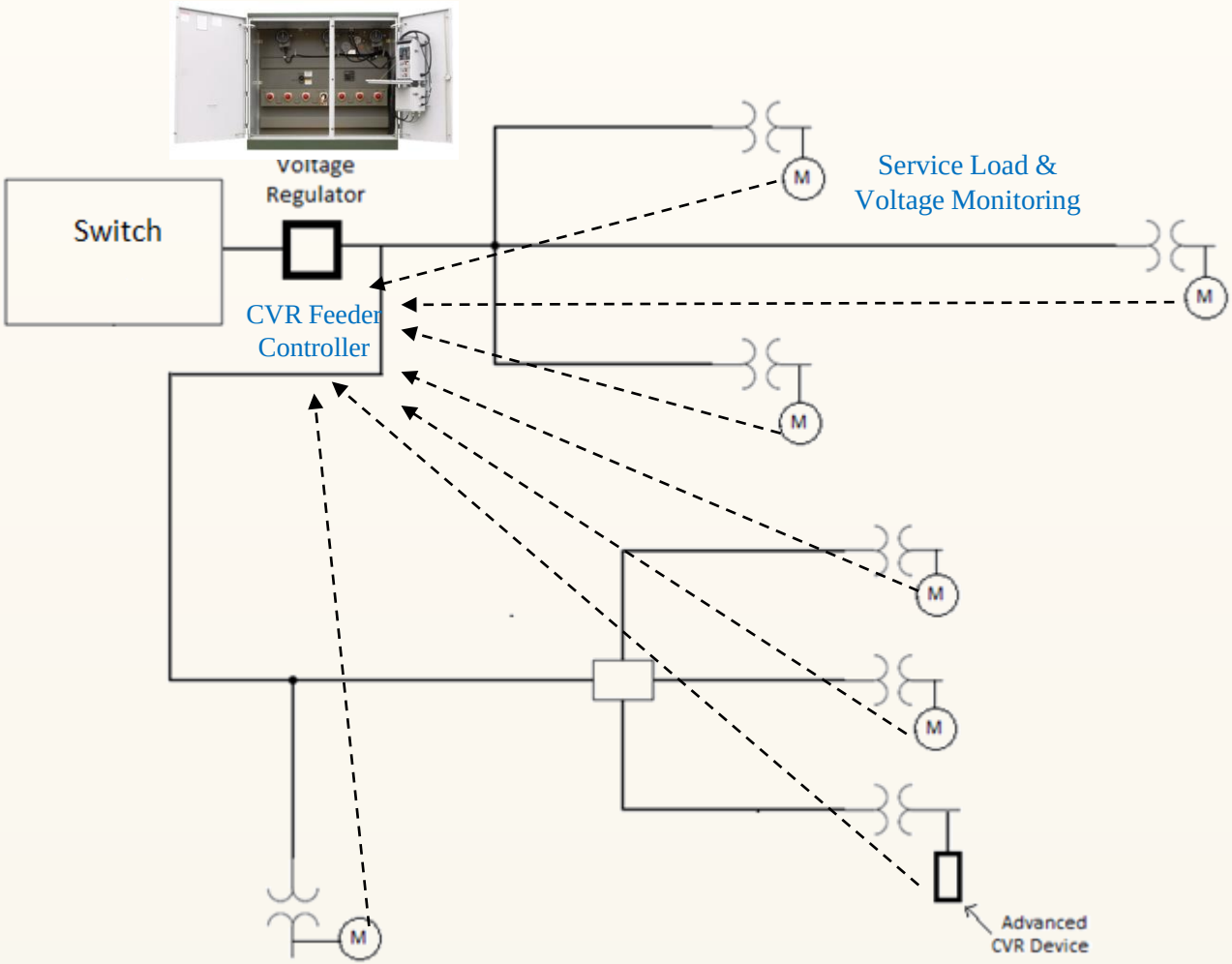
- The amp draw of certain electric devices is proportional to the voltage used to energize the device.
  - These devices are called constant impedance or partial constant impedance loads.
- When the overall voltage on a distribution system is reduced, the current (and associated demand) of all constant impedance and partial constant impedance loads will decrease.
- Loads can be broadly characterized in three categories
  - Constant Impedance (Z) [Best]
  - Constant Current (I) [Moderate]
  - Constant Power (P) [No impact]
- With each load type demand varies differently as a function of voltage

The amount of demand decrease per voltage reduced is called the CVR ratio. (%D/%V)

CVR Demonstration



CVR Demo Schematic



JWTC –Scope Concepts

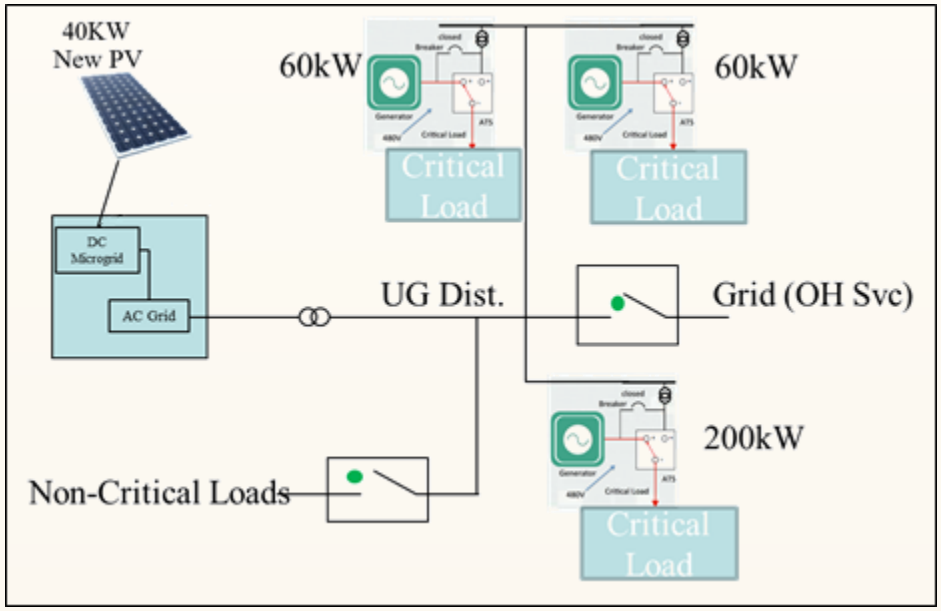
Normal Operation (Grid Connected)

- Renewable PV energy reduces commercial power purchases

Emergency Microgrid Operation (Islanded mode)

- Networked and optimized PV/diesel hybrid generation microgrid to support energy sustainability, security and extended contingency operations.
- Generator paralleling and load sharing and added efficiency opportunities (e.g. DC power system) to maximize fuel efficiency extending islanded operation
- Redundant generation resources via the networking of multiple generation resources

JWTC – Conceptual Design

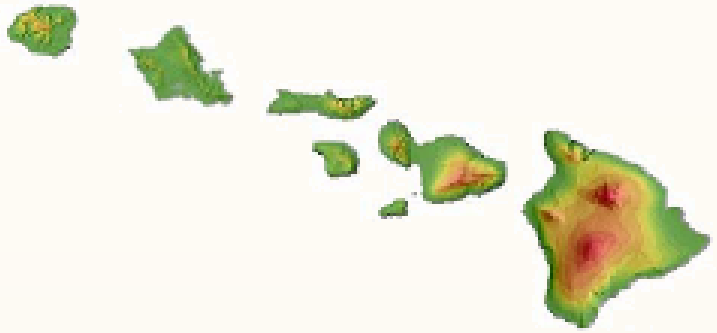


Detailed design questions to be answered

- What loads should be included?
- What is the load profile for the critical loads?
- Can generator controls be upgraded or are new generators needed?
- If new generators are needed is it better to use just one larger new one?
- DC microgrid opportunities?

Mahalo!

(Thank you)



For more information, contact:

GridSTART
Hawai'i Natural Energy Institute | University of Hawai'i
Grid System Technologies Advanced Research Team

Leon R. Roose, Esq.
Principal & Chief Technologist
Grid***START***

Hawaii Natural Energy Institute
School of Ocean & Earth Science & Technology
University of Hawaii at Manoa
1680 East-West Road, POST 109
Honolulu, Hawaii 96822

Office: (808) 956-2331
Mobile: (808) 554-9891
E-mail: lroose@hawaii.edu
Website: www.hnei.hawaii.edu

HNEI
Hawai'i Natural Energy Institute
School of Ocean and Earth Science and Technology
University of Hawai'i at Mānoa

UNIVERSITY of HAWAI'I
MĀNOA