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# Getting Utilities to "YES" on Integrating Renewables Utility Consultant Perspective

DNV-BEW Engineering

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# Opening Comment

- Utilities not opposed to integrating renewables in a cost effective and reliable manner
- Utilities must look beyond the individual and look at the total system good
- What may be good for one; may not be good for another; but good for the whole

# Utility Problems and Issues

- High penetrations of variable renewable technology (wind & solar) creates potential operating, planning, and economical issues on power plants, transmission and distribution grids
  - Unit ramping, start-up, reserve margins
  - Contingency outage issues, reliability, stability
  - New and upgrade lines, protection equipment, switching routines
  - Upgrade power plant controls and equipment

# Utility Issues Cont'd

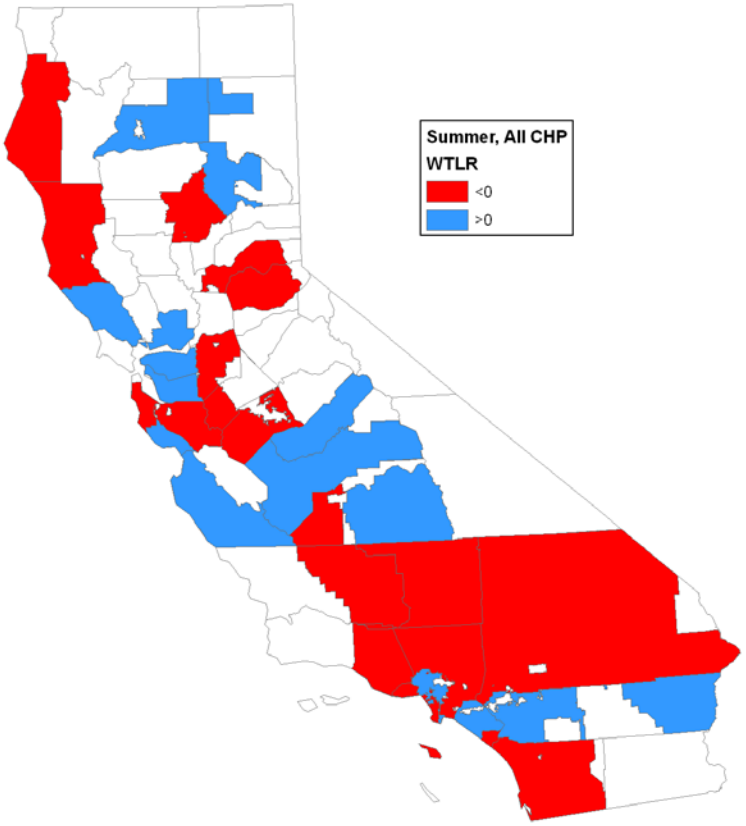
- Lack of understanding developer and customers issues as these relate to maintaining service
- Historically, distribution grid was not designed to be bidirectional flow of power
  - Design was from power plant to distribution customer load; some equipment not designed to see problems
  - PV and inverters are small power plants without controls or monitors
  - Single phase inverters lack visibility to the utility as to energy output and availability

# Customer and Developer Issues

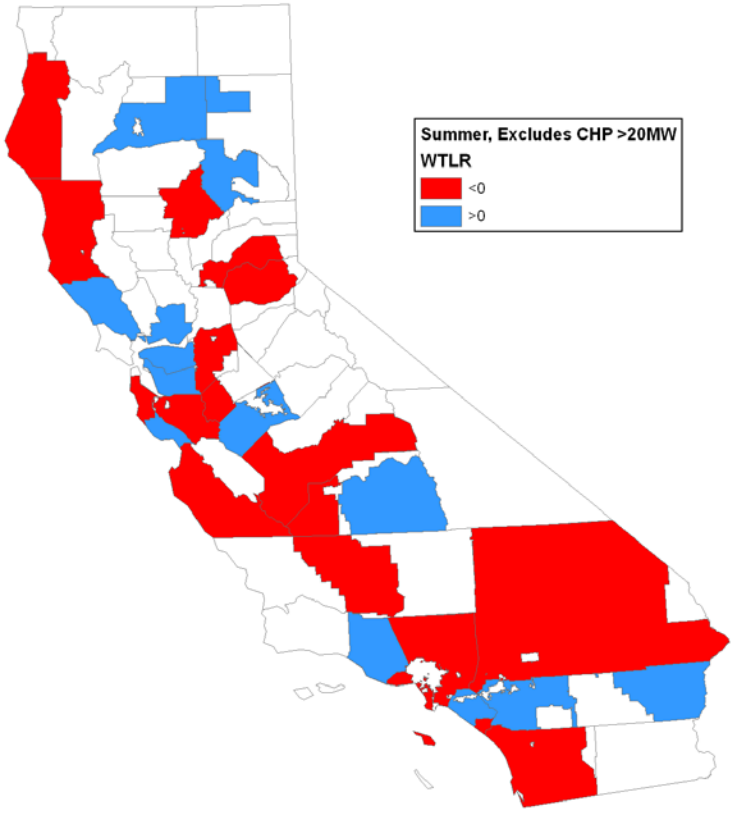
- Business needs to continually add solar customers to grow and stay in business
- Electric rate payer wants lower electric bills
- Doesn’t want utility involved in customer solar generation
- Lack of understanding of utility problems and issues

# 2020 Summer Delta AMWCO by County and Utility

Includes CHP potential 5 - 20 mw and >20 mw

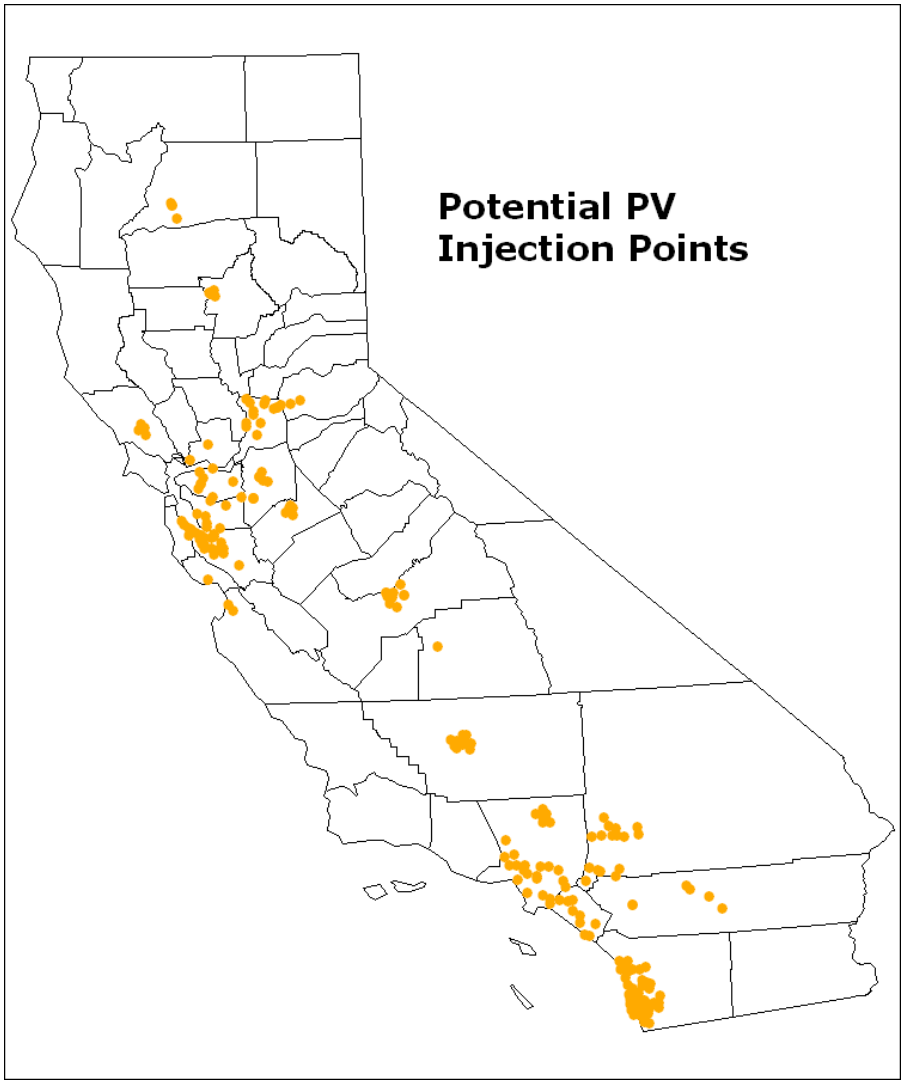



Includes CHP potential 5 - 20 mw

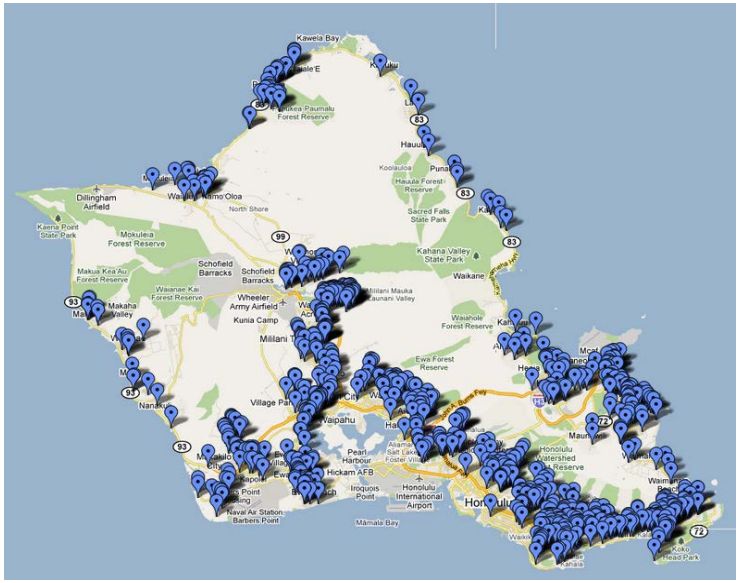



New capacity in red areas has a beneficial transmission impact
New capacity in blue areas has a detrimental transmission impact

# Potential PV Locations



# How does the Utility Keep up with PV Increases?




- Hawaii (Oahu) has over 6,000 PV installed on the distribution grid
- Majority are single phase residential installations
- Cloud cover and utility outages can create conditions where frequency and voltage fluctuations can cascade into regional outages

Source: HECO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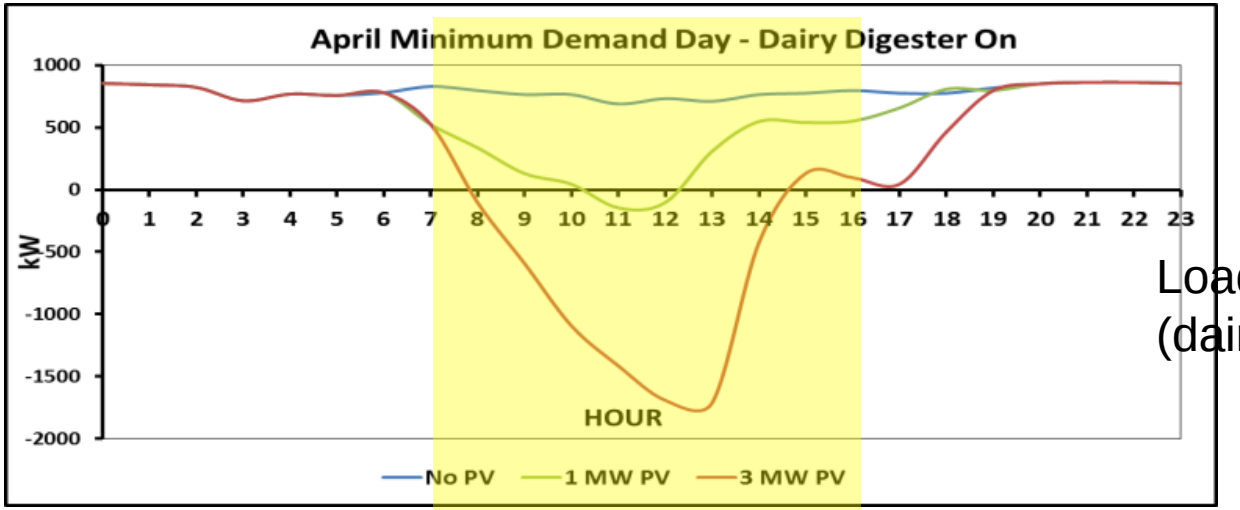
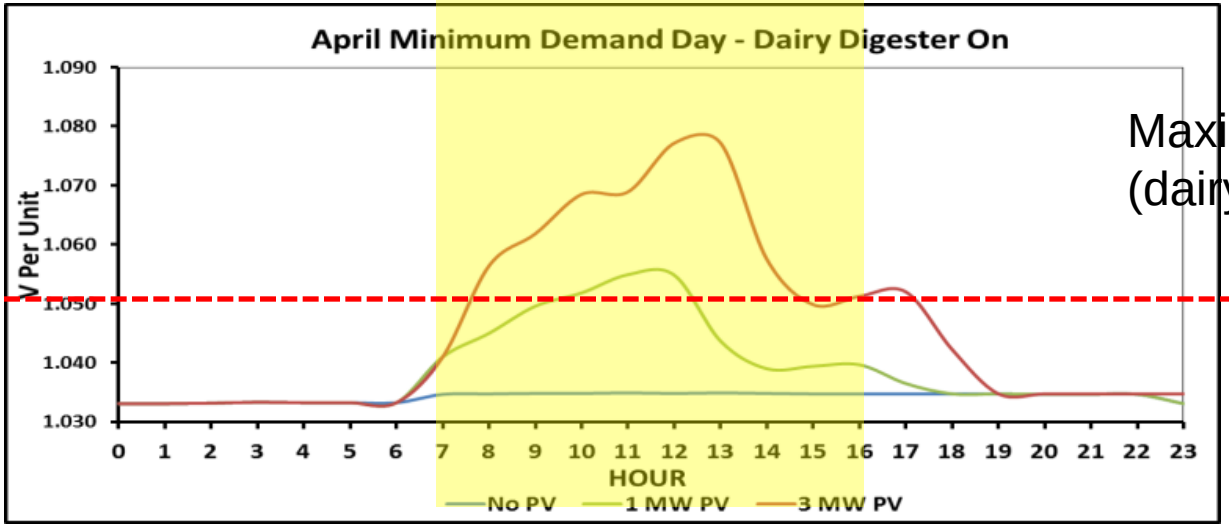
# Example of Voltage Impacts



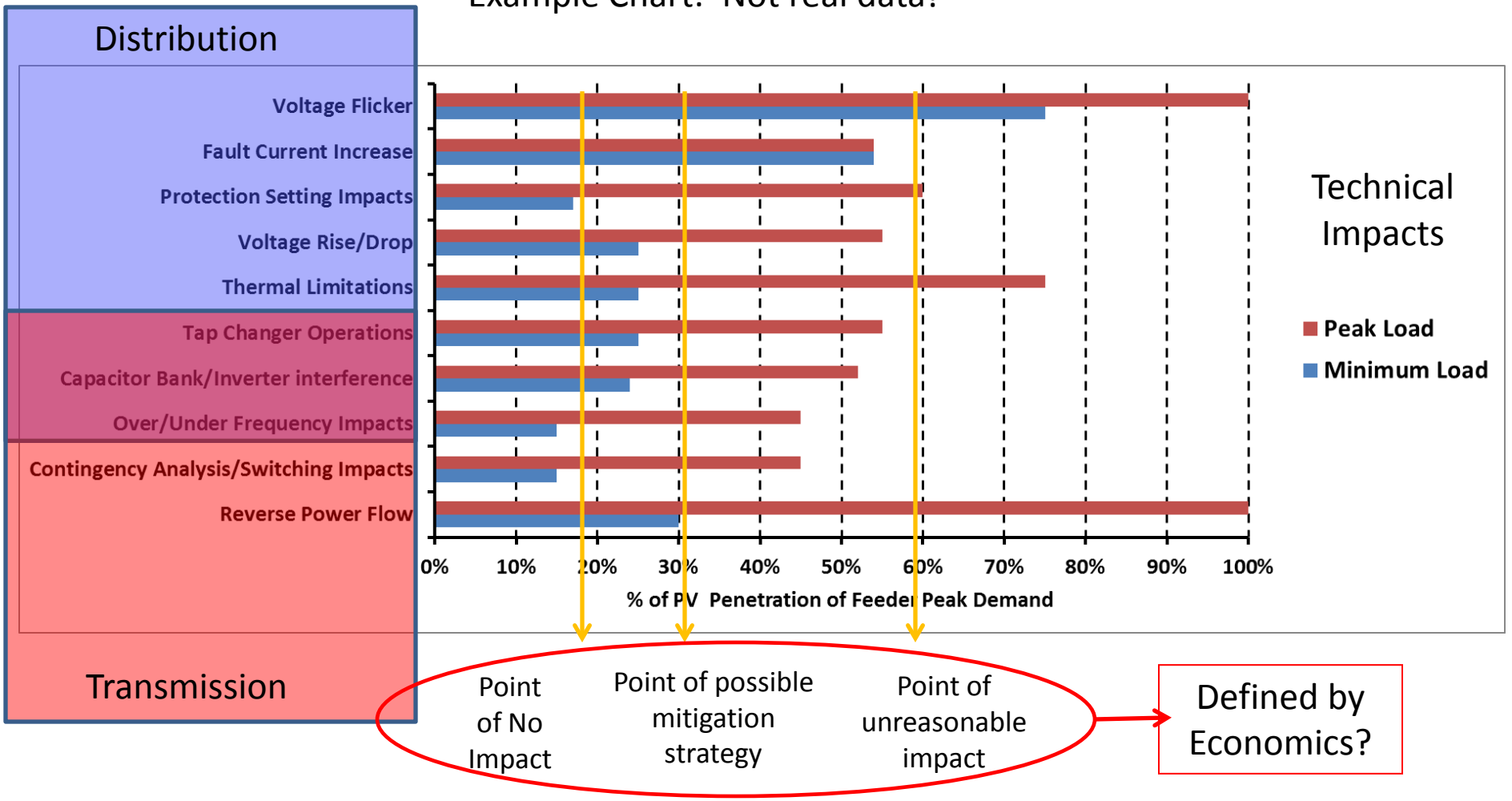

Load Flow Results
(dairy digester on)




Maximum Voltage Results
(dairy digester on)

# Goal of Steady State Analysis Studies

Example Chart: Not real data!



# Potential Solutions

- Creation of working groups and collaboratives comprised of staff from state/federal agencies, utilities, developers, manufacturers, interested parties
- Attendees are knowledgeable about utility operations, solar/inverter technology, regulations, etc.
- Leave the lawyers at home

# Key Elements to Finding Solutions

- State the goals and objectives of the group
- Everyone has a chance to present their issues
- Learn to listen to understand each other's concerns
- Leave personal or individual company interests at the door
- Provide positive feedback- not negative

# Solution Cont'd

- Utility needs to find easier ways to present complicated stability and reliability issues regarding frequency, voltage, flicker, harmonics, fault current, power plant operations, environmental changes, reverse power flows, equipment limitations, upgrades to existing infrastructure
- Utilities are developing maps listing priority areas for renewable development down to zip codes
  - Areas that can develop immediately
  - Areas that require upgrades
  - Areas to avoid due to stability and reliabiltiy

# Solutions Cont'd

- Non-utility attendees need to find ways to present issues affecting social, economic, environment, etc. in a manner related to the expansion and growth of solar installations
- Attendees need to understand utility issues to support continued renewable development, reduce oil/gas reliance, reduce GHG, electric vehicles and improve the environment
- Work with utilities in prioritizing development areas

# Examples

- California Tehachapi Wind Collaborative
- California Imperial Geothermal Collaborative
- Hawaii Commission workshops
- Utility Commission workshops
- Conferences such as this one where everyone can ask questions and seek answers

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