Updating Interconnection Screens for PV System Integration

July 19, 2012

Massachusetts DG WG (Technical Subcommittee)

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NREL
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NREL is a national laboratory of the U. S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

PV Trends in the U.S.

- Q3 2011 largest growth of PV installations in U.S. history with 449.2 MW
  - Utility installed solar over 200 MW
- Q1-Q3 2011 over 1 GW of PV installed in U.S.
- Total PV installed in U.S. over 3.1 GW, more than 10X 2005 levels
- Utility solar installation up 325% from Q1-Q3 2011

Information from 2011 SEIA Report

Updating Screens for PV System Integration

Updating Interconnection Screens for PV System Integration

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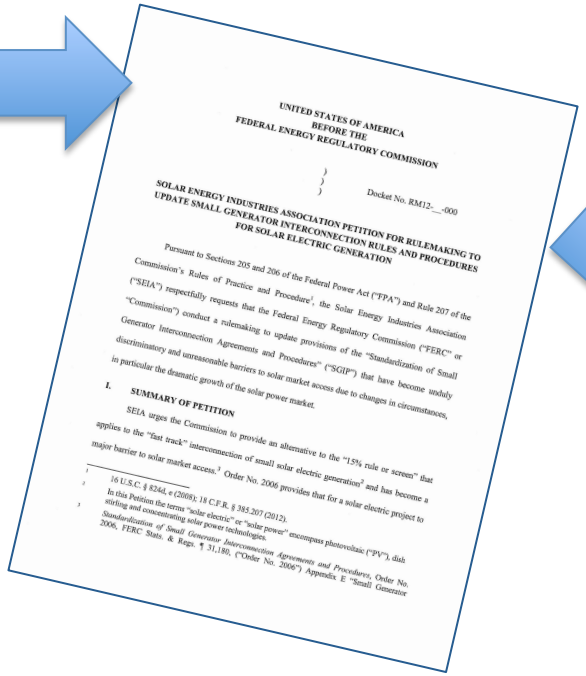

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

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) Docket No. RM12-___-000

SOLAR ENERGY INDUSTRIES ASSOCIATION PETITION FOR RULEMAKING TO UPDATE SMALL GENERATOR INTERCONNECTION RULES AND PROCEDURES FOR SOLAR ELECTRIC GENERATION

Pursuant to Sections 205 and 206 of the Federal Power Act ("FPA") and Rule 207 of the Commission's Rules of Practice and Procedure[1], the Solar Energy Industries Association ("SEIA") respectfully requests that the Federal Energy Regulatory Commission ("FERC" or "Commission") conduct a rulemaking to update provisions of the "Standardization of Small Generator Interconnection Agreements and Procedures" ("SGIP") that have become unduly discriminatory and unreasonable barriers to solar market access due to changes in circumstances, in particular the dramatic growth of the solar power market.

I. SUMMARY OF PETITION

SEIA urges the Commission to provide an alternative to the "15% rule or screen" that applies to the "fast track" interconnection of small solar electric generation[2] and has become a major barrier to solar market access.[3] Order No. 2006 provides that for a solar electric project to

[1] 16 U.S.C. § 824d, e (2008); 18 C.F.R. § 385.207 (2012).

[2] In this Petition the terms "solar electric" or "solar power" encompass photovoltaic ("PV"), dish sterling and concentrating solar power technologies.

[3] *Standardization of Small Generator Interconnection Agreements and Procedures*, Order No. 2006, FERC Stats. & Regs. ¶ 31,180, ("Order No. 2006") Appendix E "Small Generator

FERC Workshop July 17, 2012

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West Hawaii Today

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Electric exec gets lit up

HELCO PRESIDENT GETS CHILLY RECEPTION AT COUNCIL

BY NANCY COOK LAUER
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HILO — Hawaii Electric Light Co. President Jay Ignacio came before a County Council committee Tuesday to clear the air on what he said were misperceptions about the effects of solar and geothermal energy on electric rates.

"Our present challenge is being dependent on the price of oil. We are aggressively pursuing renewable energy options that will reduce that burden," Ignacio said. "We feel the pain of our customers. ... It's really that dependence on oil that we have to attack."

But rather than calming worried residents, Ignacio's slide presentation brought out a packed house of testifiers, most of them skeptical that HELCO has their best interests in mind. Most members of the council Committee on Agriculture, Water & Energy Sustainability didn't seem convinced, either.

Concerns about the risks of geothermal and HELCO's apparent resistance to allowing homeowners to hook up their own photovoltaic systems topped the list. Most of the 30 or so testifiers were Puna residents with many of them opposed to geothermal energy for health reasons.

"There was nothing in their presentation that any of their plans would reduce electric rates," said James Weatherford, a County Council candidate in the Puna district that's home to Puna Geothermal Venture, the state's only geothermal producer, which has a 30-megawatt plant. "No commitment there whatsoever."

Ignacio said HELCO is looking to increase geothermal power as a way to bring a stable source of

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Senate

base. HELCO requires the detailed study when an area of the grid reaches 15 percent saturation with solar energy. Ignacio said 15 percent is the industry standard.

"Those of us on the council represent a lot of angry consumers of electricity," Ford said.

Ignacio's explanation that studies are needed to ensure there aren't dangerous fluctuations and spikes in electric current wasn't enough to satisfy Ford. She pressed

Technical Report Goals

- Increase PV deployment levels
- Educate stakeholders
- Validate the Critical Necessity to maintain **Safety, Reliability, and Cost**
- Simplify and improve the interconnection process for utilities and stakeholders
- Reduce approval time, costs
- Lower interconnection costs supporting the DOE ***SunShot Initiative***

Technical Considerations for PV System Location

- Location of PV versus Substation
- Size of conductor / Line impedance
- Presence of voltage regulating devices
- Combined generation on circuit
- Exported power from PV system?
- Presence and location of loads
- Types of loads served by circuit

Why Focus on the 15% Screen?

- Directly relates to the Level of Deployment of PV more than any other screen
- Shows up in the majority of interconnection procedures in the U.S.
- *Perceived* as a "bottleneck" to PV deployment
- It is a limited metric derived early in interconnection development proceedings
- Field experience challenges the rationale and significance of the 15% screen

Origin of the 15% Screening Criterion

Quoting from CPUC Rule 21 Supplemental Review Guide:

"The 15% line section peak load screen is meant as a catchall for a variety of potential problems that can occur as the level of penetration of generation within the distribution system increases"

Problem: "One-Size Fits-All Approach"

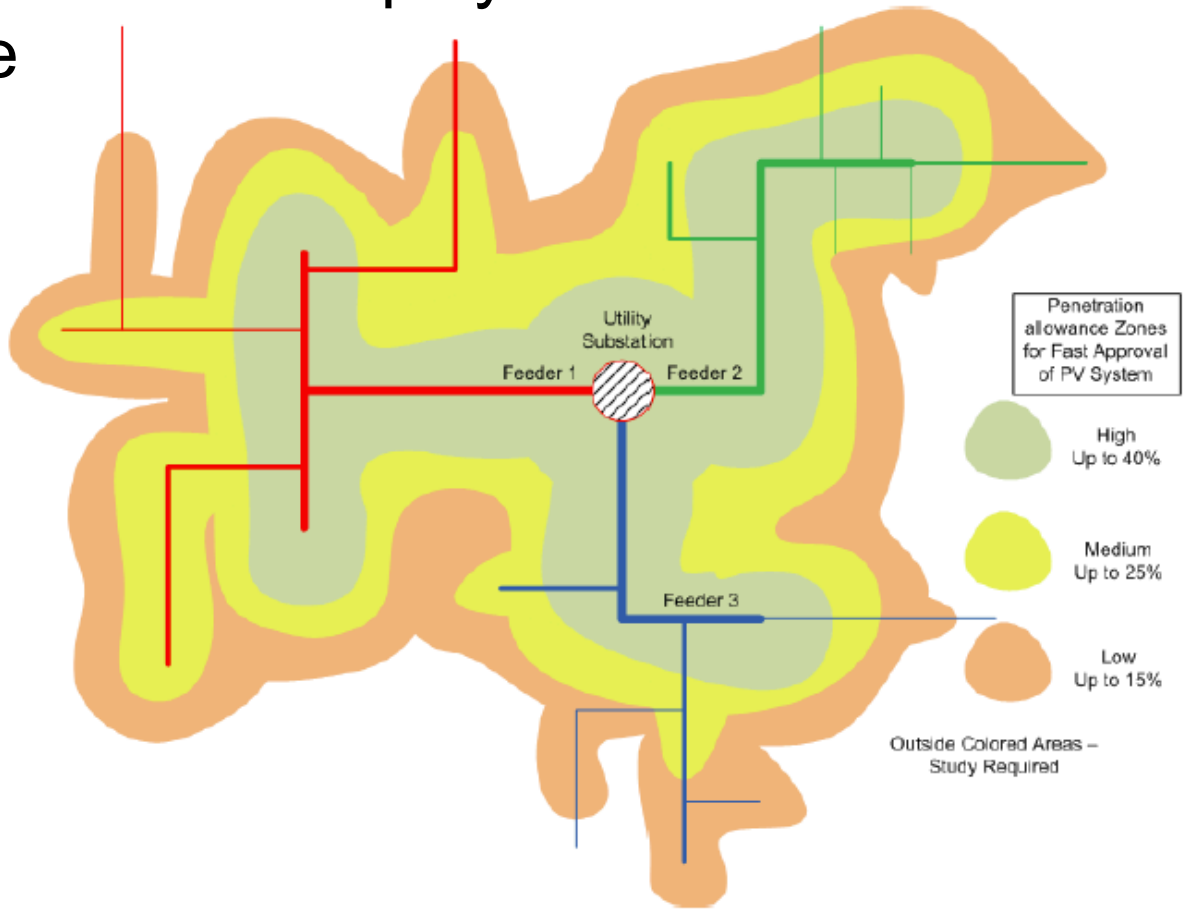
Short-Term Solutions for Consideration

Potential Supplemental Screens for PV

- Is the proposed DG a PV system?
  - Inverter-based, diurnal profile (peak 10-2)
  - PV behavior is different than traditional rotating generation (diurnal, low fault current, etc.)
- Voltage Regulation Screen?
- Anti-Islanding Screen?
- Power Quality Screen?
- Transmission Transient Stability Screen?

Zones of Penetration Maps

– Utility models determine locations that will allow greater levels of PV deployment based on impedance



Base penetration screen on minimum daytime load (MDL)data

- Use actual data rather than a “rule of thumb” which uses half of 30% of peak load
- Minimum load during 10 AM to 2 PM will capture the window of peak annual PV production (minimum daytime load)
- 15% of peak load is a ROT to estimate 50% of minimum load. Consider using actual minimum daytime load data
- SCADA systems can track MDL. Load allocation & estimation techniques can be applied

High PV Penetration Case Studies

- Circuits can operate safely and reliably on different levels of penetration
- Each feeder is unique and has different abilities to serve load and PV/DG
- Some feeders may operate well at penetration levels over 70% (even over 100%!)
- Other feeders will have major problems at penetration levels below 10%!
- One-size-fits-all is not acceptable anymore

Advanced Technical Screens

CPUC California Solar Initiative (CSI) Project (EPRI, NREL, SNL, Utilities)

- Evaluate technical screens in CA and US
- Classify feeders into topologies
- Circuit monitoring and case studies
- Modeling of high penetration/other circuits
- Straw man screen development, iterations
- Advanced technical screens based on feeder topology, system parameters, etc. should help reduce barriers to PV deployment

Long-Term Solutions

- Distribution Design Parameters (this might apply any time)
  - Larger conductors
  - Voltage Regulators
  - Better communications networks
- Advanced inverter technology
  - Inverters can be “utility-friendly”
- Low-Cost energy storage solutions
- *Grid Agent* topology and control
- Better communications and control
- Greater deployment of “Smart Grid” technology

Thank you

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