State of Florida

ORIGINAL

# Public Service Commission

-M-E-M-O-R-A-N-D-U-M-

**DATE:** September 28, 1999

**TO:** Division of Records and Reporting

**FROM:** Division of Policy Analysis and Governmental Liaison (Dean) JWD

**RE:** DOCKET NO. 990538-EI - ESTABLISHMENT OF ELECTRIC REQUIREMENT FOR SMALL PHOTOVOLTAIC SYSTEMS (10KW OR LESS) REQUESTING INTERCONNECTION AND PARALLEL OPERATION WITH AN INVESTOR-OWNED UTILITY

Attached is a fascimile transmission received on September 24, 1999, from Gerard Ventre. The facsimile contains comments the sender wishes to provide as a follow-up to the staff workshop held August 25, 1999. Please enter the comments into the record of this docket.

JWD:tf
Attachment

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**FLORIDA SOLAR ENERGY CENTER**
1679 Clearlake Road
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PH: (407) 638-1000
FAX: (407) 638-1010

**FAX TRANSMITTAL**

**TO:** **Jim Dean**

**FAX:** **850-413-6059**

**FROM:** **Jerry Ventre**

**DATE:** **September 24, 1999**

**SUBJECT:** **Interconnection Position Paper**

NO. OF PAGES INCLUDING COVER SHEET 8

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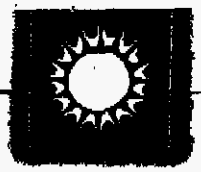
Jim,

Attached are our comments. We are also forwarding a copy to you via mail today.

Thanks, Jim.

Jerry

/ng



FLORIDA SOLAR ENERGY CENTER

September 24, 1999

James W. Dean
Technologies Specialist
Florida Public Service Commission
2540 Shumard Oak Blvd.
Tallahassee, FL 32399-0850

Dear Jim:

Attached are comments from the Florida Solar Energy Center (FSEC) in response to the Florida Public Service Commission Staff Workshop of August 25, 1999 on interconnection requirements for small photovoltaic systems.

I appreciate the opportunity to have participated in the workshop. We have tried to be as constructive as possible in framing the attached comments and recommendations, and are hopeful that the entire process will lead to the establishment of reasonable and appropriate interconnection requirements. We support the concept of an experimental tariff, and look forward to working closely with all of the Florida utilities on projects involving grid-tied photovoltaic systems.

Jim, give me a call if you have any questions about the attached comments. Take care.

Sincerely,

Gerard G. Ventre, P.E., Ph.D.
Director
Photovoltaics and Advanced Technologies Division

GGV:ng
Attachment

# FLORIDA PUBLIC SERVICE COMMISSION
# STAFF WORKSHOP

## DOCKET NO. 990538-EI – ESTABLISHMENT OF ELECTRIC REQUIREMENTS FOR SMALL PHOTOVOLTAIC SYSTEMS (10-KW OR LESS) REQUESTING INTERCONNECTION AND PARALLEL OPERATION WITH AN INVESTOR-OWNED UTILITY

## COMMENTS BY THE FLORIDA SOLAR ENERGY CENTER SEPTEMBER 24, 1999

The Florida Solar Energy Center (FSEC) offers the following comments as a follow-up to the Florida Public Service Commission Staff Workshop of August 25, 1999:

### General

FSEC believes that the requirements for interconnecting small photovoltaic (PV) systems (i.e., less than 10 kW ac) to the utility grid must appropriately address the legitimate concerns of both utility companies and potential PV system owners and end users. In developing its position, FSEC has adopted the following guidelines:

1. Interconnected photovoltaic systems should not pose safety problems to utility personnel or utility customers, and should not pose protection problems for utility equipment.

2. Interconnected photovoltaic systems should not adversely affect the reliability of electric service to utility customers.

3. The process of interconnecting small photovoltaic systems to the grid should be routine and expeditious, much like interconnecting any new home to the grid.

4. The process should not discourage utility customers from choosing photovoltaic systems to meet a portion of their electric energy needs.

### Status of IEEE 929

The earliest date for approval of IEEE P929 is during the January 28-30, 2000 meeting of the IEEE Standards Board. To meet this date, the IEEE 929 Working Group must have completed all balloting, resolved all issues, and forwarded their recommendation to the IEEE Standards Board by

December 17, 1999. The current draft of IEEE P929, Draft 11, has not yet gone to ballot. First, Sandia National Laboratories must complete additional inverter testing using a new test protocol specifically developed for inverters that use battery backup. It is anticipated that Draft 11 will go to the balloting committee by the end of October 1999. When approved, IEEE P929 will supercede the existing version of IEEE Standard 929 (i.e., the "P" will be dropped), and will be designated IEEE 929-2000..

The standard for testing inverters, UL 1741, will be amended to include the new test protocol for inverters that use battery backup, and should be available by January 2000. Utility-interactive inverters that pass the tests of the new UL 1741 standard will be, by definition, "non-islanding" inverters and will comply with all elements of the new IEEE Standard 929-2000.

**Insurance Requirements**

Utility-interactive PV systems have been in operation for two decades and number in the tens of thousands around the world. Even without the added safeguards of the new IEEE 929, UL 1741 and the 1999 National Electrical Code, these systems have had an impressive record of safe operation. Although future injuries cannot be ruled out, it is clear that grid-connected PV systems, using listed equipment in a code-compliant installation, are inherently safe.

At the August 25, 1999 workshop, it was estimated by one utility that the premium payments for a $1 million liability insurance policy would be $500 to $1,000 per year. Typical sizes of PV systems for residential applications are expected to be between 1 kW and 4 kW. At 7.5 cents per kilowatt-hour, the value of the energy produced for various sized PV systems and the annual losses in cash flow to the PV system owners, just due to insurance premiums, are as follows:

| PV System Rating (ac) | Annual PV Energy (kwh) | Retail Value of PV Production | Annual Losses to PV System Owners Due to $500 - $1,000 Insurance Premiums |
|---|---|---|---|
| 1 kW | 1,900 | $142 | $358 - $858 |
| 2 kW | 3,800 | $284 | $216 - $716 |
| 3 kW | 5,700 | $426 | $ 74 - $574 |
| 4 kW | 7,600 | $568 | -- $432 |

If the estimates on insurance costs above are accurate, it should be clear that excessive liability insurance requirements, such as a $1 million limit, not only offset the energy savings associated with photovoltaic systems, but also result in significant annual losses in cash flow for the photovoltaic system owners.

FSEC's experience with liability insurance requirements has been associated with a utility-interactive photovoltaic system (rated at 9.3 kW ac) connected to the Florida Power and Light (FPL) grid. For

FSEC's $1 million liability insurance policy, the most recent annual premium was over $6,200 (up from $5,715 the previous year). The value of the annual production of electricity from FSEC's system was less than $1,350 (at the retail rate). Because of this large loss in cash flow (i.e., nearly $5,000 per year, just due to insurance), FSEC shut down its grid-tied PV system in early June 1999.

Other states recognize that grid-tied photovoltaic systems do not pose unusual safety hazards. California, Maryland, Nevada and Oregon have explicitly prohibited additional insurance requirements for utility-interactive systems. In Idaho, New York and Vermont, utility proposals for limits of liability ranging from $500,000 to $2 million were rejected in favor of lower limits of $100,000.

In summary, the requirement of $1 million liability insurance will impede the installation of small utility-interactive photovoltaic systems, and will discourage customers from choosing this renewable technology to meet a portion of their energy needs. Certainly economic considerations should not outweigh safety considerations. However, our twenty years of experience in researching, testing and evaluating utility-interactive photovoltaic systems leads us to the conclusion that there is no real safety issue, nor is there a need for special insurance requirements. We view the requirement for $1 million liability insurance as inconsistent with the historical safe performance of PV systems and even more inappropriate in light of the new standards that are in the process of being adopted.

**Billing and Metering**

Twenty-nine states now have net metering, with action pending in one additional state. Establishment of net metering programs is typically the result of actions taken either by public utility commissions (PUCs) or by state legislatures. Programs established by PUCs usually affect investor-owned utilities only, whereas legislated net metering programs typically affect all utilities in the state. The most recent national trend has been toward state-legislated net metering programs, with four programs being established in 1997, four more in 1998, and six more in 1999 (and one pending).

A strong argument for net metering is the simplicity it brings – not only the elimination of a second meter, but also the administrative savings associated with not having to install the second meter, not having to read it, and not having to separately account for the electricity supplied by and delivered to the utility. These equipment and administrative savings from net metering at least partially offset any revenue losses suffered by utilities in crediting the customer (at the retail rate) for electricity delivered to the grid. One approach to alleviating the fear of utility revenue losses associated with net metering is to impose a statewide limit on the total amount of electricity that may be produced from net-metered systems. For example, the states of New Jersey, New York, Virginia and Washington limit the penetration of net metered systems to 0.1% of peak demand for the previous year.

For the penetration levels anticipated in Florida over the next couple of decades, net metering of photovoltaic systems will have an insignificant effect on utility revenues, but will provide major benefits to PV system users. The current PSC interconnection rule allows net metering at the customer option. We support retaining this provision.

**Inspection and Certification**

PV systems installed in compliance with the 1999 National Electrical Code (NEC) will also be in compliance with IEEE 929-2000. Consequently, FSEC recommends that the Public Service Commission (PSC) specifically include compliance with the 1999 NEC (and subsequent revisions) in the Florida interconnection requirements.

Responsibility for verifying compliance with the NEC rests with the local electrical/building inspector. FSEC plans to train code officials and to offer assistance in inspecting systems upon request. We will also offer similar training and assistance to any utility that chooses to inspect system installations for code compliance.

**What Utilities Can Do To Encourage Small PV Systems**

- Collaborate with FSEC in implementing distributed generation, community development and other PV building projects.
- Implement green power programs leading to the installation of PV systems on buildings.
- Support the removal of barriers to the commercialization of PV technology such as those presently existing with interconnection requirements.
- Collaborate with FSEC in determining the costs and benefits of small PV systems. This will require performance monitoring and data collection using statistically significant sample sizes.

**Experimental Tariff, Duration and Recommended Interconnection Requirements**

FSEC supports an experimental tariff that is reasonable and appropriately addresses the legitimate concerns of both utility companies and potential PV system owners and end users. FSEC's position is that grid-tied PV system installations that comply with the new IEEE 929 standard should satisfy all of the legitimate concerns of utilities. To satisfy the concerns of potential PV system owners, FSEC strongly recommends interconnection requirements that are fair and do not in any way discourage utility customers from choosing PV systems to meet a portion of their energy needs.

FSEC recommends that the experimental tariff be put into effect from January 2000 through December 2003. During this period, the following interconnection requirements should be met for small (less than 10 kW ac) photovoltaic systems:

**1. Inverter(s)**

The inverter(s) must be listed and in compliance with *Underwriters Laboratories (UL) 1741, Standard for Static Inverters and Charge Controllers for Use in Photovoltaic Systems.*

**2. Photovoltaic Modules and Panels**

a. Photovoltaic modules and panels must be listed and in compliance with *Underwriters Laboratories (UL) Standard 1703, Standard for Safety: Flat-Plate Photovoltaic Modules and Panels.*

b. Photovoltaic modules must be in compliance with *IEEE Standard 1262-1995, IEEE Recommended Practice for Qualification of Photovoltaic (PV) Modules.*

**3. System Installation**

The PV system must be installed by a licensed contractor and be in compliance with:

a. *IEEE 929-2000, Recommended Practice for Utility Interface of Photovoltaic Systems.*

b. All relevant articles of the *1999 National Electrical Code®* (or subsequent revisions).

**4. Metering and Billing**

The utility shall inform the photovoltaic system owner or end user of their option to choose "net metering." If the energy produced by the PV system exceeds the premises load for any billing period, the utility will allow a monthly carryover credit. However, the owner or end user will not be paid for excess energy delivered to the utility and, at the end of a 12-month period, the utility may cancel any remaining credit.

**5. Liability Insurance**

The maximum amount of liability insurance that may be required of the PV system owner or end user is $100,000. A standard homeowners policy meets this requirement.

**6. Satisfying the Interconnection Requirements**

To satisfy all interconnection requirements, all items of the attached application and compliance form must be completed and properly signed. No additional paperwork is required.

# INTERCONNECTING A SMALL PHOTOVOLTAIC SYSTEM TO THE ELECTRIC UTILITY GRID

## APPLICATION AND COMPLIANCE FORM

### A. Applicant Information

Name: _____

Mailing Address: _____

City: _____, FL Zip Code: _____

Street Address (if different from above): _____

Daytime Phone: _____ Fax: _____ Email _____

Electric Utility Name: _____ Account No.: _____

### B. Photovoltaic System Information

System Name/Model: _____ Inverter Power Rating _____ ac watts

List Manufacturer/Model for:

Modules: _____ Inverter _____ Batteries (if applicable): _____

Array Location: _____ Inverter Location: _____

AC Disconnect Location: _____ Permission to Monitor? ☐ Yes ☐ No

### C. Installation Contractor Information

Installation Contractor: _____, FL License No.: _____

Address: _____

City: _____, FL Zip Code: _____

Daytime Phone: _____ Fax: _____ Email: _____

Proposed Installation Date: _____

### D. Hardware and Operation Compliance

1. The system hardware is in compliance with *Underwriters Laboratories (UL) 1741, Standard for Static Inverters and Charge Controllers for Use in Photovoltaic Systems* and *UL 1703, Standard for Safety: Flat-Plate Photovoltaic Modules and Panels*, and *IEEE 1262-1995, IEEE Recommended Practice for Qualification of Photovoltaic (PV) Modules.*

2. The system has been installed in compliance with *IEEE Standard 929, Recommended Practice for Utility Interface of Photovoltaic Systems* and the *1999 National Electrical Code® (NEC).*

Signed (Contractor): _____ Date: _____

Name (Print): _____ Company: _____

### E. Owner Acknowledgment

The system has been installed to my satisfaction and I have been given system warranty information, and an operation manual. Also, I have been informed of the option to choose net metering, and have been instructed in the operation of the system.

Signed (Owner): _____ Date: _____

### F. Electrical Code Inspection and Utility Approval

1. Satisfies Code Requirements

Inspector Name (Print): _____

Inspector Signature: _____ Date: _____

2 Satisfies Utility Interconnection Requirements

Utility Representative Name (Print): _____

Utility Representative Signature: _____ Date: _____