



Memorandum

Department of Planning, Zoning & Building
2300 North Jog Road
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To: Building Division Plan Review and Inspection Staff
From: Doug Wise, Building Division Director
Date: December 20, 2019
Re: 2017 NEC Updated/ New PV Articles & Requirements

Issue:

Nicholas Meyers, Tesla Energy Operations Inc. (TEO), has requested that the Building Division consider adopting the new and updated articles of the 2017 National Electric Code (NEC) specifically related to Utility-Interconnected Photovoltaic installations incorporating Energy Storage Systems (ESS). TEO currently has several jobs on hold because staff is having a difficult time inspecting these installations using the 2014 NEC.

Code Analysis:

The 2017 NEC includes many revisions to existing PV articles, as well as providing new articles for "Microgrid Systems" (705 Part IV), "Microgrid Interconnect Devices" (705), "Energy Storage Systems" (706), and "Stand-Alone Systems" (710).

- Microgrid System - A premises wiring system that has generation, energy storage, and load(s), or any combination thereof, that includes the ability to disconnect from and parallel with the primary source.
Microgrid System Operation - Microgrid systems shall be permitted to disconnect from the primary source of power or other interconnected electric power production sources and operate as a separate microgrid system.
Microgrid Interconnect Device (MID) - A device that allows a microgrid system to separate from and reconnect to a primary power source.
Energy Storage System (ESS) - One or more components assembled together capable of storing energy for use at a future time.
Article 706 Energy Storage Systems - This article applies to all permanently installed ESS(s) that may be stand-alone or interactive with other power production sources.

These new code articles clarify a utility-interactive PV system is permitted to operate as a separate microgrid system, in stand-alone mode, when interfaced with a listed MID device, or with appropriate listed inverters that provide MID functionality. Section 705.40, 2017 NEC, states: "Upon loss of primary source an electric power production source shall be automatically disconnected from all ungrounded conductors of the primary source. The grounded conductor is not required to be disconnected, in fact, 705.40 has the following Exception: "A listed interactive inverter shall be permitted to automatically cease to automatically cease exporting power upon loss of primary source and shall not be required to automatically disconnect all ungrounded conductors from the primary source".

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**Compliance:**

Palm Beach County Amendments to the 2017 Florida Building Code (Section 104.11) gives the building official the authority to approve materials, methods, and designs that are not specifically prescribed in the code when sufficient evidence is provided to substantiate they are compliant with the intent of the code.

The 2017 NEC has been adopted by many States and has also been included as a *referenced standard* in the preliminary 2020 Florida Building Code (proposed adoption date of 12/31/2020). Based on that inclusion and the improved depth and clarity of the 2017 articles/sections, the PBC Building Division Director has authorized the pre-adoptive use of Articles 690, 691, 705, 706 and 710 as codified in the 2017 NEC.

There are several models of listed MIDs currently in production that enable PV Microgrid Systems to operate in '*stand-alone/island mode*' in order to supply loads that have been disconnected from the utility. These MIDs have a wide range of 'smart' and 'intuitive' capabilities that monitor and control energy flow between the Utility, ESS and PV Array. All Utility-Interactive PV systems with ESS capability are required to be installed with listed devices, controllers and equipment using methods prescribed in the NEC.

Solar energy technology continues to advance rapidly, therefore, innovative equipment and non-traditional methods not referenced in the current codes may be approved by special request upon submittal of adequate documentation to verify the safety and intent of the code is accomplished.

**Actions:**

**1. Supervisors**

- Ensure staff are fully aware of the latest advances in PV technology and equipment.
- Advise Codes, Product & Training staff of any new and/ or non-conventional methods or equipment being proposed or installed.

**2. Plan Reviewers**

- Confirm adequate listing and manufacturer's specifications are included in the plan for all equipment and devices.
- Confirm MIDs/ Multi-mode Inverters are *Service-Rated* if being installed ahead of the existing Service Main Disconnect, as well as indicating removal of the existing Main Bonding Jumper to facilitate proper separation of Neutral and Grounding conductors in all panels downstream from the main disconnect.

**3. Inspectors**

- Confirm all installed equipment matches the *approved* plan and is installed in strict accordance with manufacturer's specifications and listing requirements.
- Ensure installation meets all general and detailed Code requirements.