

# External Disconnect Switch for Inverter Based Generation

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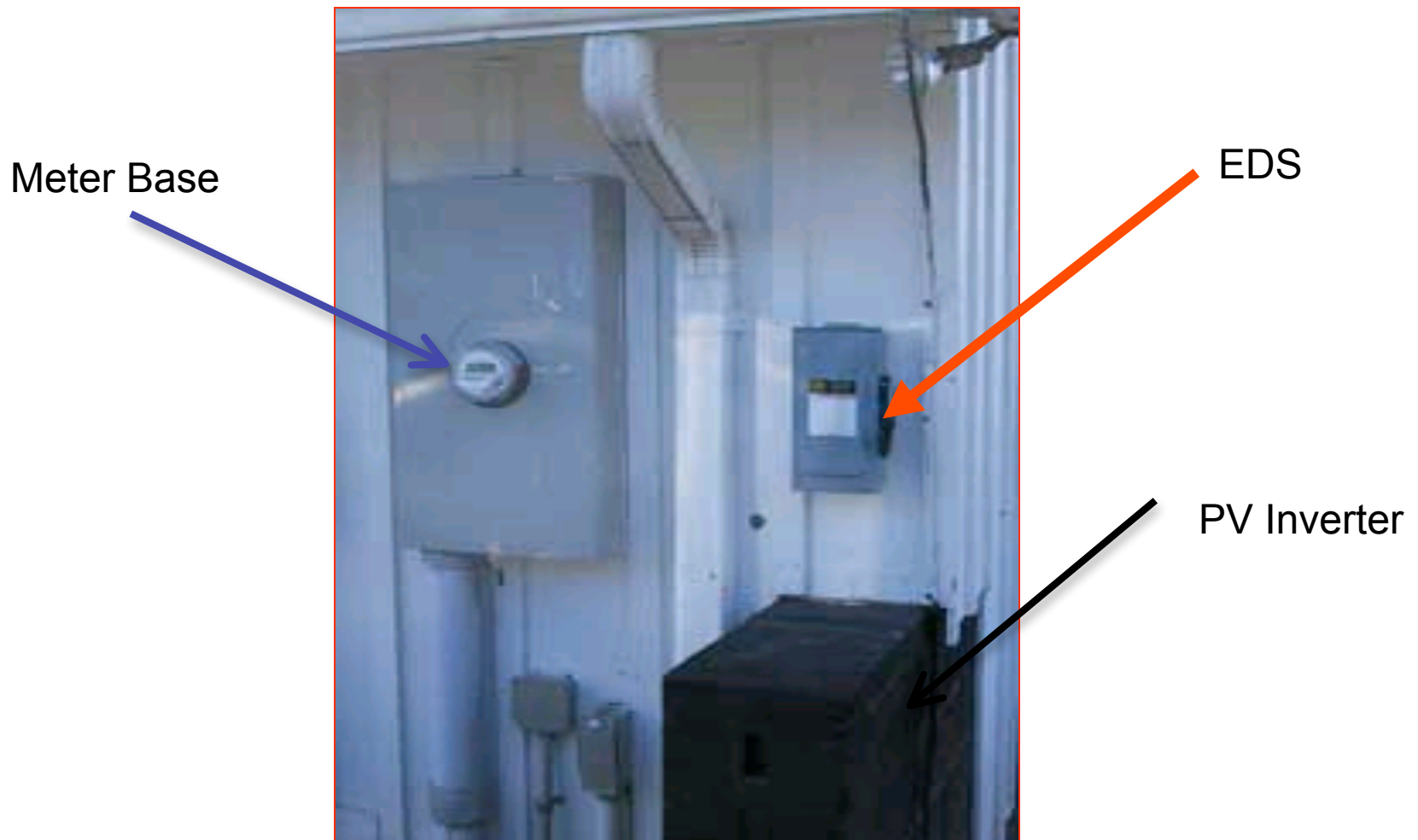


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# External Disconnect Switch Overview

- Technical issues
- Practical considerations
- Legal reasons
- NEC vs. NESC safety
- Next steps

# What is an External Disconnect Switch?



# Why is the EDS Issue Relevant?

- EDS could become a cost adder of over 15% of overall cost as PV system costs decline
- Cost to install the EDS can be equivalent to 20 to 40 months of output revenue from a small PV system
- Things (standards) have changed since the “Gardner” PV system early 1980’s

# Technical Standards

- U.S. standards are voluntary
- IEEE 929-2000 recommended practice for PV systems (terminated with adoption of IEEE 1547)
- IEEE 1547-2003 Standard for Interconnecting Distributed Resources with Electric Power Systems
- IEEE 1547 was needed but PV is not the same as other DR technologies
- UL 1741 covers inverters, converters, and charge controllers, and interconnected system equipment

# IEEE 1547.3

Section 4.1.7 states:

“when required by area EPS operating practices, a readily accessible lockable visible-break isolation device shall be located between the area EPS and the DR unit.”

**Bottom line**: removal of the EDS requirement will be done state-by-state

# NEC vs. NESC

- National Electrical Code (NEC) is part of National Fire Protection Association (NFPA)
- NEC applies to “utilization facilities” (homes, business and commercial).
- NEC legally mandated in most states
- National Electric Safety Code (NESC) is part of the IEEE
- NESC applies to “supply facilities” (generation, substations and power lines)

# NEC Requirements for Disconnect Switches in 690 Section III

- The NEC requirement for disconnects for PV systems are covered primarily in Article 690.
- Generally, NEC requires a disconnect (which can be a breaker) for each source of power or energy storage device in the system.
- Location must be readily accessible - walk up to switch, no ladder necessary, outside the building
- or nearest the point of entry.
- ***These switches include some that are not accepted in the NESC world***



# NESC Requirements for Disconnect Switches

- The old NESC states in Section 173C that a visible break disconnect switch is mandatory only for circuits of more than 600 V, and then only if lines may have to be worked on without protective grounding.
- Under “Tentative Interim Amendment 2002-1” NESC has deleted entire rule.
- The need is now justified under “safe switching procedures.”

# NEC covers safety operations

- NEC already address the need for switches on PV system
- EDS switch is “redundant” to switches identified in NEC
- NESC does not have “special requirements” for PV generation
- Utility need for an open visible break can be addressed without the EDS

# EDS not required for inverter-based systems

- PG&E statement available at [http://www.pge.com/suppliers\\_purchasing/new\\_generator/solar\\_wind\\_generators/disconnect\\_switches/](http://www.pge.com/suppliers_purchasing/new_generator/solar_wind_generators/disconnect_switches/)
- SMUD press release available at [http://www.smud.org/news/releases/07archive/02\\_21solar.pdf](http://www.smud.org/news/releases/07archive/02_21solar.pdf)
- EDS not a requirement in New Jersey or Colorado (see 4 CCR 723-3, Rule 3665, and see N.J.A.C. 14:4-9)

# Different Conclusions for the need of EDS

- EDS not required in New Jersey but is required in Maryland?
- One of SMUD's reasons for eliminating the EDS was the fact that the servicemen do not carry enough locks on service trucks to lockout PV on a circuit. SMUD may have 100-200 PV systems on one circuit.
- No one has identified a need or a problem once the EDS has been eliminated.

# Next Steps

- Pursue IREC targeted states to eliminate the EDS in rulemaking proceedings
- Continue to document states, utilities and other organizations that have eliminated the EDS
- Pursue discussions with IBEW and other influencers. Discuss the changes in standards and the elimination of the EDS by states and other organizations.

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