National Renewable Energy Laboratory
Innovation for Our Energy Future

Utility-Interconnected Photovoltaic Systems: Evaluating the Rationale for the Utility-Accessible External Disconnect Switch

Michael H. Coddington, Senior Engineer

National Renewable Energy Laboratory • Golden, CO 80401

External Disconnect Discussion

- Utility-Accessible, Visible-Break, Lockable AC Switch (PV Systems)
- Typically Required by Utilities if they are given the Decision
- Considered Unnecessary Expense by System Integrators and Customers
- The AC EDS is Rarely Used (if ever)

Prime Focal Points for Utilities

- Safety (NESC, OSHA)
  - National Electrical Safety Code
  - Occupational Safety and Health Administration
- Reliability (S.A.I.D.I. - S.A.I.F.I. etc.)
  - System Average Interruption Duration Index
  - System Average Interruption Frequency Index
- Cost (Capital and Expense)
  - Capital Investments (Return On Investment)
  - Expenses (Some Expense Not Recoverable)

Critical PV System Standards

- IEEE 1547
  - Cornerstone Standard Interconnection
  - Addresses Both Sides of Utility Meter
- UL 1741
  - Sets Standards for Grid Connection
    - Units Disconnect from Grid with Voltage/Frequency Variations
- National Electrical Code
  - The "Law" in Most Jurisdictions beyond meter

Utility Line Work Practices

- New Construction
  - Test and Ground – Work "Cold"
- Electric System Trouble
  - Assume Energized – Work "Hot"
- Timely Restoration of Outages
  - Safe and Fast Outage Restoration Critical

Utility Accessible EDS - Redundant

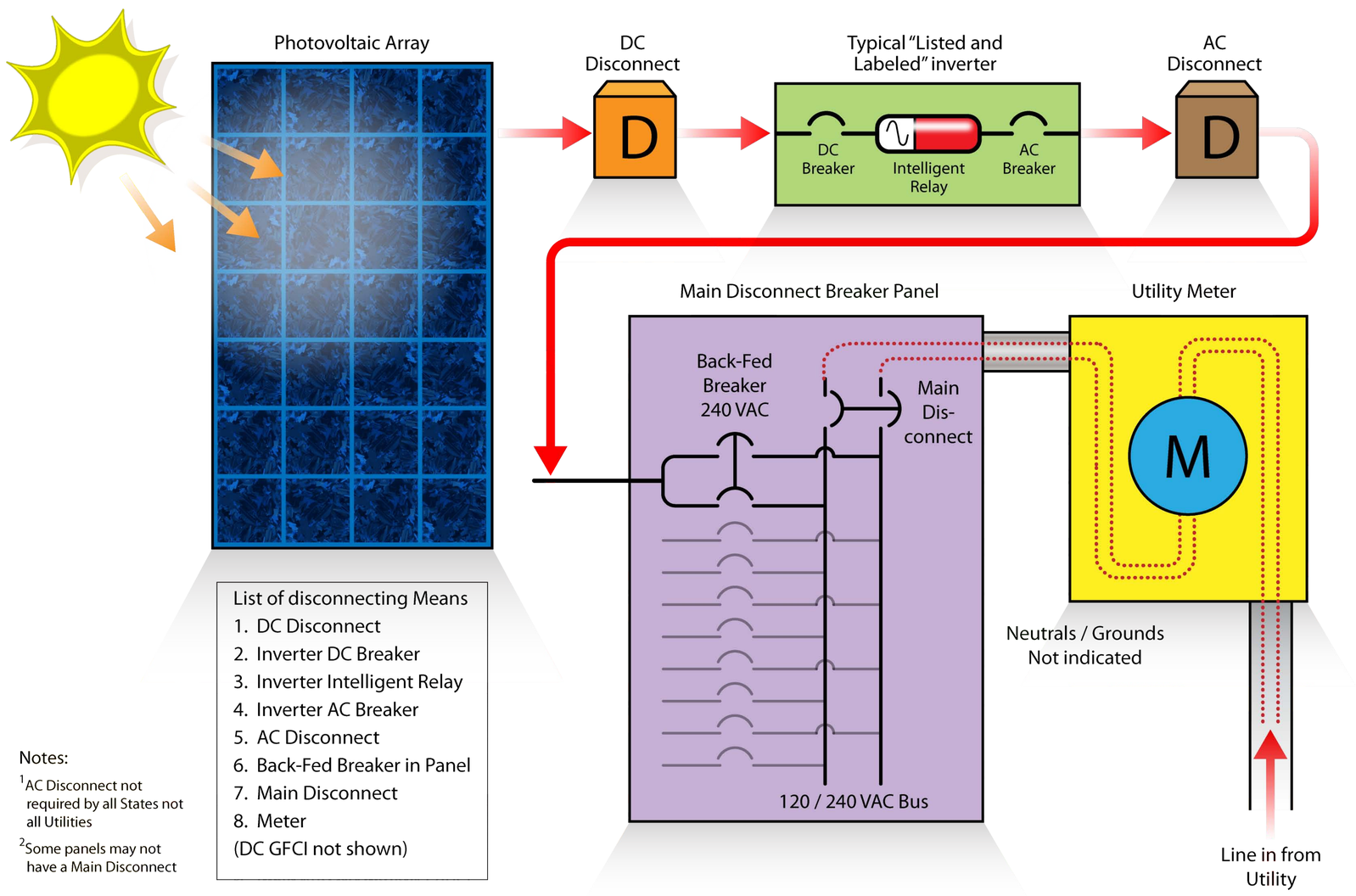
- PV Systems Have Many Disconnects
- Utilities Tend to Ignore EDS
- PG&E and SMUD Don't Require EDS
- Some PUCs Have Eliminated EDS Requirements or Defer to Utilities

Why Utilities Ask for UA EDS

- Protection of Line Workers
- In the Event of a Feeder Outage
- To Protect Line Equipment
- Isolation of Customer Problems
- Isolation of All Power Sources

Who Has Eliminated the EDS Requirement?

- SMUD
- PG&E
- Arkansas, Florida, New Jersey



Presented at the 33rd IEEE Photovoltaic Specialists Conference • San Diego, CA • May 11–16, 2008 • NREL/PO-520-43295