Wind Loads on PV Arrays

Solar ABC’s Project
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Problems:

• Existing codes lack guidelines for PV systems

• Existing codes are intended for design of buildings

• Many interpretations are possible for same design

• Many PV systems are significantly over-designed or under-designed to withstand expected wind speeds.
Status

1. Guideline published - application of existing code to roof-mounted systems (PV parallel to roof)

2. Future work
   A. Guideline pending – application of existing code to ground-mounted systems
   B. Wind tunnel testing on roof-mounted PV
Solar ABCs Report Published

Wind Load Calculations for PV Arrays

- Report available online: www.solarabcs.org/wind
- Applicable to roof-mounted PV systems where PV is parallel to the roof and supported on racks up to 6” above the roof
- Based on the American Society of Civil Engineers Minimum Design Loads for Building and Other Structures (ASCE 7-05)
- Next step = peer review; need feedback from structural engineers and aerodynamics experts
Future Work

Guideline for Ground-Mounted Systems

• ASCE standard is more readily applied to ground-mounted PV than roof-mounted PV: geometry is more like a building/carport (“unenclosed building”)

• Will recommend which ASCE tables to use to estimate wind pressure
Future Work

Wind Tunnel Testing in 2011-2012

• First priority = roof-mount, PV sloped
• Second priority = roof-mount, PV parallel (if $$)
• Will select wind tunnel based on competitive bid
Future Work

Wind Tunnel Testing - Approach

• Tests must be applicable to as many common rooftop PV geometries as possible

• Must address sensitivity to many variations in PV geometry

  • PV height above roof
  • PV tilt angle
  • Horizontal spacing between rows of PV
  • Obstructions below PV
  • Roof slope
  • PV location on roof
  • Presence of rooftop objects
  • Building size and shape
  • …and more
Future Work – 2011-2012

Publish Recommendations

- Guideline to estimate wind loads for roof-mounted sloped PV and ground-mounted PV
- Updates existing report on roof-mounted parallel PV
- Recommend changes to ASCE-7 if applicable
- Peer reviews
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