SUSTAINABLE SOLAR EDUCATION PROJECT

Solar Equipment, Installation, and Licensing & Certification: A Guide for States and Municipalities

February 9, 2017

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CleanEnergy States Alliance

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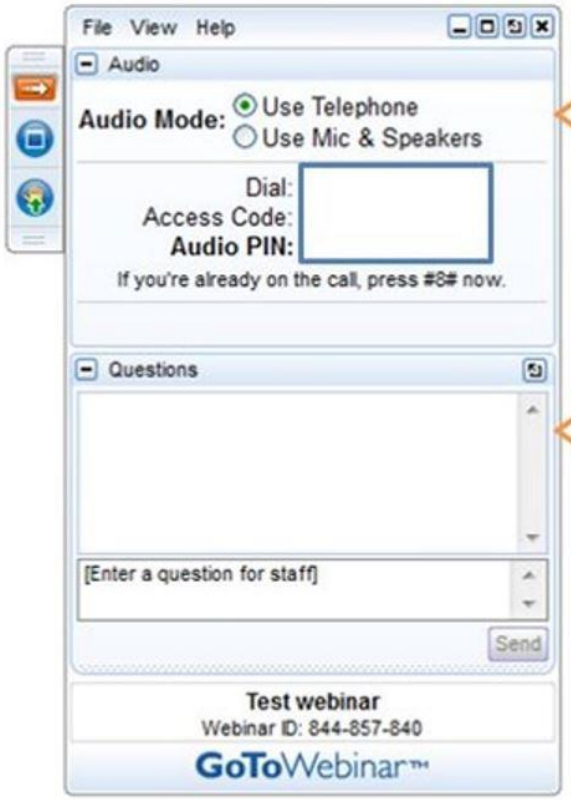

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About CESA


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New Hampshire PUBLIC UTILITIES COMMISSION
ALASKA ENERGY AUTHORITY
MINNESOTA DEPARTMENT OF COMMERCE
CONNECTICUT GREEN BANK
MASSACHUSETTS CLEAN ENERGY CENTER
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NEW HAMPSHIRE DEPARTMENT OF Environmental Services
MassDEP

Sustainable Solar Education Project

- Provides information and educational resources to state and municipal officials on strategies to ensure distributed solar electricity remains consumer friendly and benefits low- and moderate-income households.
- The project is managed by the CESA and is funded through the U.S. Department of Energy SunShot Initiative's Solar Training and Education for Professionals program.
- Sign up for the Sustainable Solar mailing list to receive our free monthly newsletter and announcements of upcoming events

www.cesa.org/projects/sustainable-solar

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Nate Hausman, Project Director, Clean Energy States Alliance

KEYES&FOX LLP

EQ Research

SUSTAINABLE SOLAR EDUCATION PROJECT

Standards and Requirements for Solar Equipment, Installation, and Licensing and Certification

A Guide for States and Municipalities

February 9, 2017

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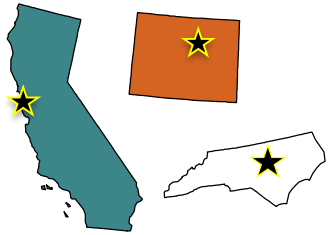
About Us

KEYES&FOX LLP

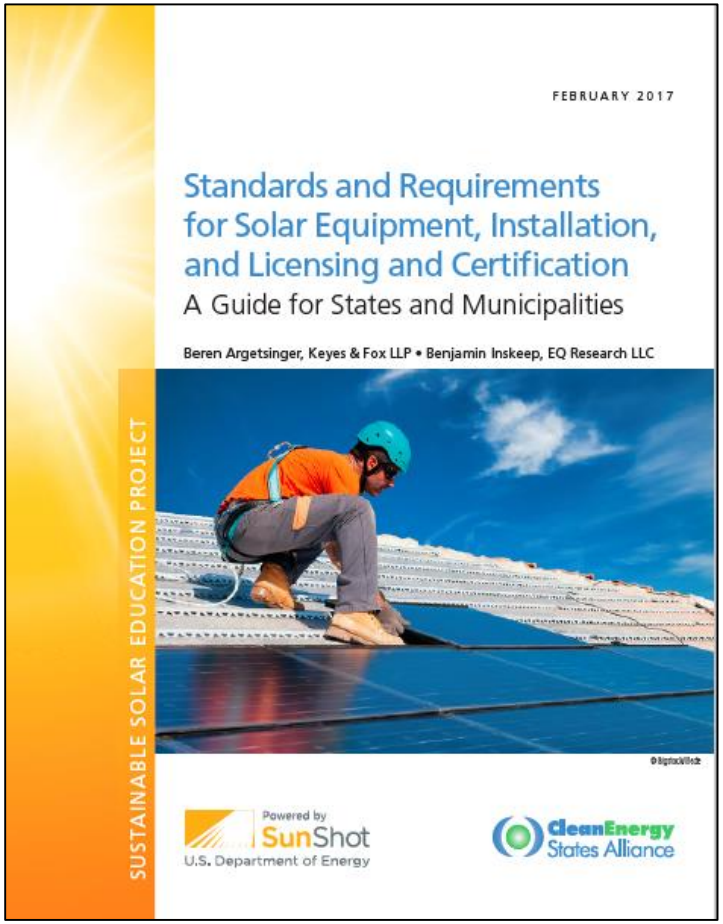
- **Law firm** specializing in distributed generation and renewable energy law.
- Attorneys have appeared before over 40 state public utility commissions to advance clean energy policies.

EQ Research

- **Consulting firm** providing policy research, analysis, and data services to businesses active in clean energy, energy storage, and electric vehicles.
- Subscription services include comprehensively tracking legislative and regulatory proceedings in clean energy across all 50 states.



Outline



1. Installation Codes
   - Building
   - Fire
   - Electrical

2. Licensing & Certification
   - Electric Licensing
   - Third-Party Certification
   - Installer Databases and Contractor Lists

3. Equipment
   - Standards
   - Warranties

Installation Codes

Installation Codes: Key Issues

- Restrictive or ambiguous language
- Long lag time in updating codes
- Extreme variation across jurisdictions
- Inconsistency in enforcement

Installation Codes: Buildings

- Minimum solar PV requirements related to:
  - Installation
  - Structural/engineering
  - Materials
  - Wind resistance
  - Fire classification

- International Code Council updates model codes every 3 years

Example: Oregon Solar Installation Specialty Code

- First statewide solar code in U.S. (2010)
- Expedited permitting for installations meeting prescriptive requirements

Installation Codes: Buildings

- "Solar Ready" Buildings
  - Rooftop equipment minimized
  - Designate roof area
  - North-South orientation
  - Interconnection pathway documented
  - Roof specifications

Example: Requirements for Solar on New Buildings

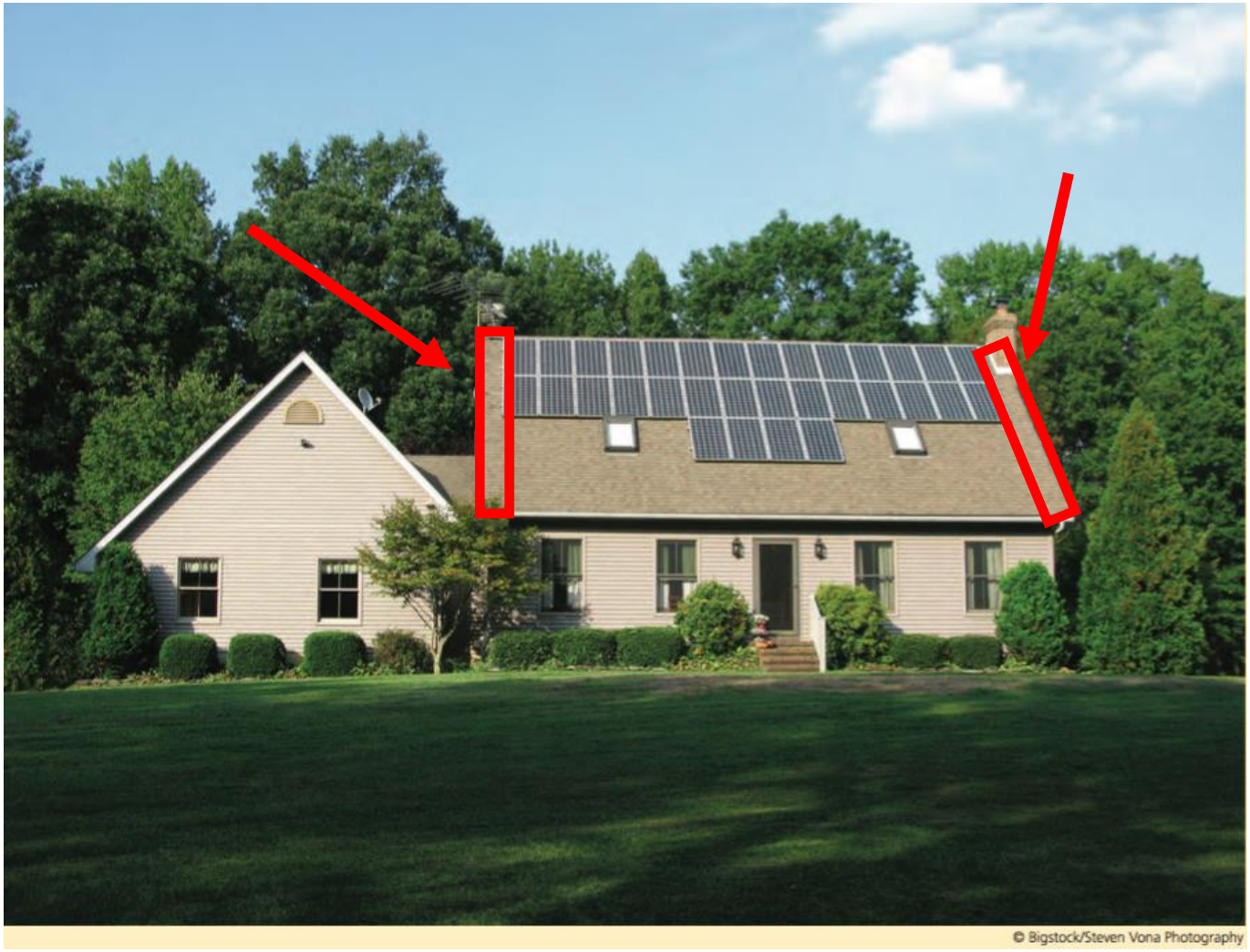
- Four California cities
- Pending California legislation

Installation Codes: Buildings

- Streamlining Permitting & Inspection
  - Online information and application
  - Standardize application fees
  - Reduce timelines
  - Training

Example: Connecticut Green Bank
- Outreach, training, and resources for local governments

Installation Codes: Fire



Installation Codes: Fire

Purpose

- Mitigate Potential PV Hazards:
  - Tripping
  - Structural
  - Fire spread
  - Toxics inhalation
  - Electrical shock

International Fire Code

- Pathways
  - 3 ft. wide
- Spacing
  - 150 ft. x 150 ft. max array size
- Setbacks
  - 3 ft. (residential)
  - 6 ft. (nonresidential)

Installation Codes: Electrical

Purpose

- Safety for first responders, contractors, & homeowners

National Electrical Code

- National Fire Protection Association (NFPA 70)
- Updates in 2011, 2014, & 2017 specific to PV
- Comprehensive electrical safety design, installation & inspection requirements

Installation Codes: Electrical

Key Issues

- Technical electrical specifications
- Signage and Labeling
- Rapid Shutdown

Recommendations & Considerations

- Strengthen awareness among building officials, permitting staff, and first responders about rooftop PV systems
- Offer training, education and outreach to firefighters and building officials
- Facilitate an inclusive stakeholder process when adopting or updating codes
- Consider model codes as a starting point and incorporate local conditions and stakeholder input as appropriate
- Provide clear and consistent code enforcement and transparent process for appealing enforcement actions

Licensing & Certification

Licensing & Certification: Key Issues

- State and local administration of licensure
- Type or level of electric license required
- The definition of “electrical work”
- Licensed to non-licensed electrician ratio requirements
- Leveraging Third Party Certification

Licensing & Certification

License

- Grant of legal authority
- Mandatory requirement

Examples

- General electrician license
- Limited electrician license

Certification

- Voluntary credential
- Third-party administration
- Supplements license

Example

- NABCEP PV Installer Professional Certification

Licensing

General Electrician Licensing

TABLE 1: **General Electrician Licensing in Selected States: Training and Ratio Requirements**

State	License Type	Minimum Training Required	Ratio of licensed electrician to non-licensed apprentice
Idaho[57]	Journeyman	Classroom: 576 credit hours (4 years); On-the-job training: 8,000 hours (4 years)	1:3
Massachusetts[58]	Journeyman	Classroom: 600 credit hours; On-the-job-training: 8,000 hours (4 years)	1:1
Minnesota[59]	Journeyman	On-the-job training: 8,000 hours (4 years)	1:2
Wisconsin[60]	Journeyman	Classroom: no minimum requirement (but educational experience may be claimed toward required experience; On-the-job experience: 8,000 hours (4 years)	1:1

Examples of the general electric license and the ratio of licensed to non-licensed apprentice requirements for PV installation in some states.

Licensing

"Limited" Electric Licensing

TABLE 3: **Examples of Solar "Limited" Electric Licenses and Training Requirements**

State	Name/License Type	Minimum Training Required
California[69]	C-46 Solar Contractor	Classroom: no minimum; On-the-job-training: 4 years of solar experience (apprenticeship training and advanced education is credited, but 1 year of practical experience required
Connecticut[70]	PV-1 – Limited Solar Electric Contractor	Classroom: 144 hours; On-the-job training: 4,000 apprentice hours (2 years)
Oregon[71]	Limited Renewable Energy Technician	Classroom: 144 hours; On-the-job training: 4,000 apprentice hours (2 years)

Certification

Third-Party Certification

- NABCEP
  - Photovoltaic Associate
  - PV Installation Professional
- Electrical Training Alliance
- Underwriters Laboratory
- Building Performance Institute

State Certification

- Oregon Solar Trade Ally

Licensing & Certification: Other Issues

Contractor Lists & Installer Databases

- California installer database
- NYSERDA participating contractor list
- Connecticut GoSolarCT eligible contractor list

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Recommendations & Considerations

- Determine whether state or local circumstances or technological advancements warrant deviation from National Electric Code electric licensing recommendations for PV installations
- Clearly define licensing and certification requirements and enforcement guidelines
- Consider adopting certain third-party certification requirements as part for contractor eligibility to participate in solar programs
- Provide clear and transparent solar installer contractor lists

Equipment Standards & Warranties

Equipment Standards & Warranties: Key Issues

- Government and third-party mandated equipment standards
- Equipment eligibility lists
- Manufacturer and Workmanship Warranties

Equipment Standards

Third-Party Standards

- UL product safety standards
  - E.g., UL 1703 PV module performance standard
- IEEE standards
  - E.g., IEEE 1547 interconnection standard

State-Mandated Standards

- California Energy Commission equipment standards list
- Florida Solar Energy Center certification

Warranties

Types

- Manufacturer warranty
  - Product warranty
  - Performance warranty
- Workmanship warranty
- Production guarantee

Recommendations & Considerations

- Provide clear information for contractors and consumers and about equipment standards and warranty requirements

- Evaluate existing government and third party standards and solicit stakeholder participation when developing or updating standards and warranties

Conclusions and Key Takeaways

- ✓ Installation codes, licensing & certification, and standards and warranties are critical components of sustainable solar markets
- ✓ A review of existing codes may reveal areas that can be updated to bring codes in line with solar policy goals
- ✓ Well designed codes, rules, and standards are important policy levers that can improve the customer experience, enhance safety, and ensure that rooftop PV development meets public policy goals and expectations

When developing or revising codes and standards:

- ✓ Solicit a diversity of stakeholder input
- ✓ Identify model codes and state examples to use as guides
- ✓ Clearly define the standard or code applicable for PV
- ✓ Address implementation hurdles
- ✓ Consider the impact of technological advancements
- ✓ Provide training and education opportunities
- ✓ Make information transparent, easily to find, and current

Thank you!

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