

**SOLAR AMERICA BOARD FOR  
CODES AND STANDARDS**  
**SOLAR ABCs**

**BUILDING ELECTRICAL CODES PANEL**

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# BUILDING ELECTRICAL CODES PANEL

## Focus will be on the US *NEC*

- **US *National Electrical Code (NEC)*®**
  - Published by the National Fire Protection Association
  - 110 years old, 50 editions
  - 800 pages or more
  - Article 690 (PV Systems) 11 pages, but 70% of code applies
  - Legislated into *law* by all states and most major cities
  - Various editions being used (i.e. NY, 1999; CA 2002)
- **The 2011 *NEC* cycle has just begun**
- **All proposals are due by NOV 2008**

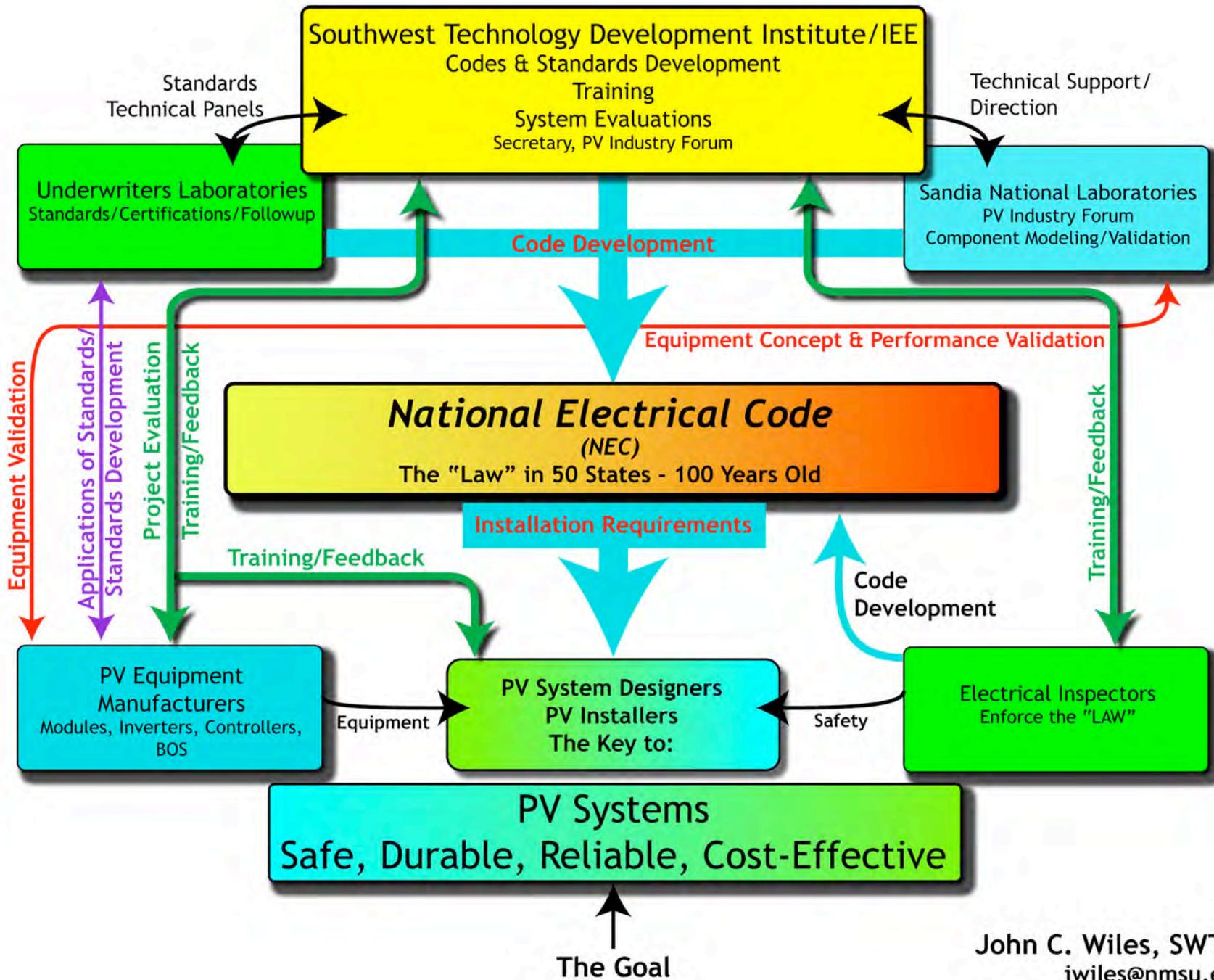


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# ***National Electrical Code (NEC)®***

- **Chapters 1-4, The Basics**
  - 1 Definitions and General Requirements
  - 2 Wiring and Protection
  - 3 Wiring Methods and Materials
  - 4 Equipment for General Use
- **Chapters 5-8, Special Circumstances**
  - 5 Special Occupancies
  - 6 Special Equipment (Solar Photovoltaic Systems-Art 690)
  - 7 Special Conditions
  - 8 Communications Systems
- **Chapter 9, Tables**
  - Conductor and conduit properties
- **Annexes**
  - Conduit Fill Tables, Examples, Product Safety Standards



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# The Code Making Process

- **National Electrical Code Committee**
  - Technical Correlating Committee (TCC)-Chair, Sec, 8 members, 8 alt
  - 19 Code Making Panels (CMP)-Chair, 10-16 members, 10-16 alt
  - NFPA Electrical Engineering Division Technical Staff-8 members
  - NFPA Staff Editor
- **Committee Scope**
  - This committee shall have primary responsibility for documents on minimizing the risk of electricity as a source of electric shock and as a potential ignition source of fires and explosions. It shall also be responsible for text to minimize the propagation of fire and explosions due to electrical installations.



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# The Code Making Process

- **Code Making Panel 13**

- **COVERS:** Articles 445 (Generators), 455 (Phase Converters), 480 (Storage Batteries), 690 (PV), 692 (Fuel Cells), 695 (Fire Pumps), 700 (Emergency Systems), 701 (Legally Required Standby Systems), 702 (Optional Standby Systems), and 705 (Interconnected Power Sources) [about 29 pages of the NEC]
- **MEMBERS:** Nat Elec Cont Assc, Int Assc Elect Inspectors, **SEIA**, Am Chemistry Council, Special Experts, Telecom Industry, IEEE, Associated and Contractors Builders, Independent Electrical Contractors, Utilities, UL, Fuel Cell Council, IBEW, ETL, Am Soc Ag Engineers, Elec Gen System Assc
- **SEIA**
  - Ward Bower, SNL, Member limited to 690, 692, 705
  - Ron Wills, Alternate



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# The Code Making Process

- **The Schedule**

- Nov 2008 **Proposals due NFPA**
- Jan 2009 CMPs meet
- Apr 2009 TCC meets
- Jul 2009 Report on Proposals (ROP) published
- Oct 2009 **Comments on ROP due NFPA**
- Nov 2009 CMPs meet
- Feb 2010 TCC meets
- Mar 2010 Report on Comments (ROC) published
- Jun 2010 NFPA Annual Meeting
- Jul 2010 Standards Council Issuance
- Sep 2010 *2011 National Electrical Code* published



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# The Code Making Process Proposals

- **Anyone may submit proposed changes to the *NEC***
- **The form is in back of Code book and online from NFPA**
  - Mailed and electronic submissions accepted
- **NFPA *NEC Style Manual* must be followed**
  - Does not always follow other style guides
- **Each proposal must be substantiated**
  - Substantiations must be technically valid, clear and concise
- **For the *2008 NEC***
  - 61 Proposals Submitted,
    - 42 by the PV Industry Forum (from 12 circulated drafts)
    - 19 by other individuals or organizations
    - More than 40 changes were made



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# PV Industry Forum

- **A Task Group suggested by NFPA to address PV requirements**
- **About 110 individuals**
  - Ward Bower, Chair
  - John Wiles, Secretary
- **Drafts, Substantiates, Coordinates, and Submits Proposals**
  - Very few meetings
  - E-mail coordination
- **Primary organizational structure to work the *2011 NEC* cycle**



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# The *2011 NEC*

- **Want to *actively* participate?**
  - Order a copy of the *2008 NEC* today from
    - [www.NFPA.org](http://www.NFPA.org), [www.IAEI.org](http://www.IAEI.org), major bookstores
  - Get a copy of the *2008 NEC Handbook* in January 2008
  - Immerse yourself in Chapters 1-4, Art 690 and other areas relating to PV
  - Join the PV Industry Forum: e-mail to [jwiles@nmsu.edu](mailto:jwiles@nmsu.edu)
  - Download the NFPA *NEC Style Manual*  
<http://www.nfpa.org/assets/files/PDF/NECSTYLEMAN03.pdf>
  - Visit the SWTDI Codes and Standards Web Page for additional information:
    - <http://www.nmsu.edu/~tdi/Photovoltaics/Codes-Stds/Codes-Stds.html>
- **Just need periodic updates?**
  - Visit the Building Electrical Code page on the Solar ABCs web site:
    - [http://www.solarabcs.org/codes/panels/bldg\\_elec\\_codes.htm](http://www.solarabcs.org/codes/panels/bldg_elec_codes.htm)
- **Please Note: This Panel will not be able to provide basic education in either PV systems or the *National Electrical Codes*.**



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# On the Agenda

- **Fix typos, grammar, and sentence structure in 690 and 705**
- **Revise 690.64 to remove Art 705 material**
- **Specify when OCP is required at battery location**
- **Address short-circuit output current of inverters driving transformers (690.9(B)).**
- **Revisit inverter/system DC grounding**
- **Clamp backfed breakers on the output of stand-alone inverters**
- **Consider added loads from battery charging on U-I systems**
- **690.64(B) issues associated with battery-backed up U-I systems**



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# On the Agenda

- **705 Distinctions between inverters and rotating machines**
- **Specify types of labels—engraved**
- **Fire Department requirements**
- **Bipolar arrays**
- **Ungrounded arrays**
- **690.62 clarify neutral currents**
- **Readily Accessible, Exposed Single Conductors**
- **Buck-type Charge Controllers**
  
- **Areas that Increase Safety**
- **Areas that Reduce Cost**
- **Areas that Increase Reliability**



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