

IEEE Standards Development The Individual vs The Entity Method

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Your Presenter

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- Mechanical and environmental lab lead
- BS in mechanical engineering
- Working on MS degree
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About NEETRAC

What: *Research, Testing and Applications Center in the School of Electrical & Computer Engineering at Georgia Tech*

Scope: *Electric Energy Delivery (Generator to the Meter)*

Approach: *Applied R&D, Membership-Based, Consortium Focus, Self-Supporting*

Membership: *Electric Utility Industry in North America*

Size: *38 Members, 28 Staff*



History: *Began in 1996 with transfer of the Georgia Power Research Center to Georgia Tech*

Mission: *Advancing the Electric Grid through Collaboration*

Facilities: *High Voltage, Medium Voltage, Mechanical, and Environmental*

Membership

**NEETRAC started with 10 Members in 1996.
We now have 38.**

- 20 Utilities
- 15 Manufacturers
- 3 Associates
- (24 have been members for > 10 yrs.)

Utility Membership

- 76 million US Electric Customers
- ~ 60% of US Customer Base

Manufacturer Membership

- Represent a large portion of the providers of products and services to the electric utility industry



Facilities



Facilities



Accelerated Cable Aging



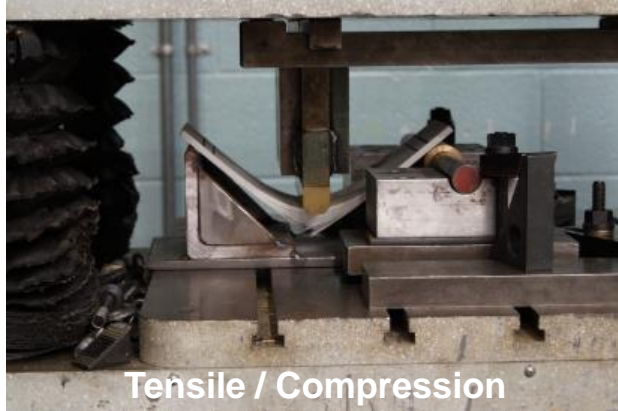
Research into Joint Aging



Research into the consequences of mis-installing automatic connectors



Facilities



Facilities

Connector Testing



Tensile Testing



Agenda

- Discuss IEEE standard development methods
 - Individual Method
 - Entity Method
- Look at differences between individual and entity standards
- Discuss some concerns surrounding entity standards:
 - NEETRAC's experience on entity working group ballots
 - Issues from IEEE 1863-2019, IEEE 2870 & IEEE 2871
- How to tell the difference between individual and entity standards
- Ensure you're using standards and guides developed by/for your region!

About this Presentation

- NEETRAC members asked NEETRAC to develop and disseminate this presentation in response to corporations in other regions using the entity standards development process to develop standards that conflict with how utility systems are designed, constructed and operated in North America.
- This presentation was funded by NEETRAC's members.
- This presentation includes reviews from NEETRAC's senior engineers and technical representatives from Member Organizations who are involved in many standards development organizations (SDOs), including IEEE.

IEEE Standards

- Who here uses or references IEEE standards at work?
- Who here has worked on an IEEE working group?
- What do you believe about IEEE standards and guides?
- Do you believe?
 - engineers with 30 to 50+ experience, meet twice a year for several years to develop a standard or guide?
 - those engineers had experience with systems that may be very similar to yours?
 - the working group and ballot group were open to any IEEE member, including retirees and specialists in private practice?

IEEE Standards

- Do you believe?
 - many technical experiences and points of view were considered?
 - the standard or guide represents a consensus of technical opinion and experience?
 - the standard or guide was thoroughly reviewed with multiple comments from multiple sources ultimately being resolved through an open process?
- When purchasing standards, do you think critically and perform a thorough review and analysis of the standard?
- Why not?

Trust!

IEEE standards and guides have historically been trusted because the belief of the users were validated by standard/ guide's technical reliability.

IEEE Standards

- But, what if
 - there was also a different process
 - where corporations developed standards
 - where working group meeting dates are provided 1 to 2 weeks in advance
 - corporations from the other side of the globe
 - and they published their translated domestic standards
 - Where no one in ballot group finds more than one issue
 - the working group slides contain vote totals before any votes have been taken

IEEE Standards

- Such a thing exists and is called:
- ***The Entity Standards Development Process***
 - Used in a few other IEEE Technical Societies for the last 10 years
 - Relatively new to the Power and Energy Society
 - Standards and guides conflict with other North American utility system standards

What's an Entity

- In 2012 IEEE formed the corporate advisory group for “the corporate community to develop timely standards that support industry consensus on a global scale.”
- What is an entity
 - Corporation
 - Government body
 - University
 - Non-profit
 - The “entity” pays for a corporate membership in the IEEE Standards Association.
 - Cost is \$4.5k to \$16k per year

The Entity Method

“The Entity Program allows companies to engage and influence technology development to ensure their business interests are heard and represented.” IEEE-SA Website

Two Methods to Develop Standards

IEEE has two standards development processes:

- Individual: Individuals form working groups to develop and update standards.
 - Very popular among engineers in North America (NA)
 - Focus tends to be on public safety and reliability
- Entity: Corporations form working groups (and assign representatives) to develop and update standards
 - Very popular in China.
 - Focus is on corporate interests and influence.

Difference Between Development Processes

Individual

- Open to individuals (any IEEE member)
- Open voting participation
- 10 individuals required to form a working group
- 10 individuals minimum to ballot*
- Individual standards protect the public welfare

*Balloting requires individuals/entities hold a Standards Association (SA) membership in addition to their PES Membership

Entity

- Open to entities
- Open to listen and speak
- 3 entities required to form a working group
- 5 entities minimum to ballot*
- Entity standards promote the self interests of corporations

Difference Between Development Processes

Individual

- Regional preference:
Predominantly used in North America

Entity

- Regional preference:
Predominantly used in China

-
- Both work under a technical committee.
 - The technical committee only provides procedural oversight.
 - The working group is responsible for technical accuracy and content.
 - Both working groups own the standards until it is released.

NEETRAC's IEEE Corporate Membership

- NEETRAC joined IEEE SA as a corporate member to represent NEETRAC Members and gain insight into the entity development process.
- Corporate membership includes:
 - Unlimited working group attendance as participants
 - Unlimited balloting on entity standards (NEETRAC has 1 vote)
 - Eligibility to serve as an entity working group officer
 - Subscriptions and access to corporate programs newsletters, news, alerts, events, and private web areas

Concerns with Entity Standards

- The two standard development processes are very different.
- Some of the standards generated by the entity process conflict with other standards used in North America.
 - IEEE 1863 Guide for OHL Design conflicts with the NESC
 - IEEE 2870 conflicts with ANSI C119 and IEC 61284.
 - IEEE 2871 conflicts with ANSI C119 and IEC 61284.

IEEE 1863

IEEE 1863 (1 of 5)

IEEE 1863 Guide for Overhead AC Transmission Line Design

- Scope includes foundations, structures, conductors, connectors, hardware, and insulators.
- Developed through the CAG.
- The Overhead Lines Subcommittee of the T&D Committee formed a task force address this during the development.
- The task force found 194 issues with the guide.
- The task force requested withdrawal or correction.

IEEE 1863 (2 of 5)

- Released in 2019
- Developed by entities such as China Jiliang University, State Grid Corp of China, Zuoyi Power Equipment Co, Jaingsu Jiameng Electric Equipment
- It is believed to be an English Translation of their design guide for northern China

IEEE 1863 (3 of 5)

- The writing contains confusing passages such as:
 - “The first fitting connected with the cross-arm may be able to rotate flexibly, and is reasonably imposed with force, and its strength may be a level higher than that of other fittings within the same string.”
- Only components used by State Grid of China corporations are discussed:
 - Non-ceramic insulators and certain designs of ceramic insulators are not addressed. Only designs used by SGCC are addressed in Standard 1863.
 - Commonly-used connectors and fittings are not addressed.
 - Tubular steel, concrete, and fiberglass structures are not discussed.

IEEE 1863 (4 of 5)

- IEEE 1863 is not harmonized with IEEE C2, “National Electric Safety Code (NESC)”. The NESC has force of law in many North America jurisdictions. NESC discrepancies include:
 - Wind load design criteria
 - Wind direction for computing the structure load can be simplified into 45 degree steps. The NESC references ASCE 74 for computing wind loads and requires using a wind direction that maximizes loading from line tensions and line angles.
 - Wire load design criteria
 - The method for computing broken wire loads are less severe than stipulated in ASCE 74.

IEEE 1863 (5 of 5)

- NESC discrepancies include:
 - Assumes less conservative return intervals for weather loads than the NESC.
 - Specifies a 50 year wind speed Mean Recurrence Interval (MRI), but the NESC requires a 100 year MRI.
 - Describes a linear conductor model for computing line tensions, ground clearances, and worker safety clearances. While the NESC is silent on conductor models, North America practice since the 1920s has been to use a non-linear conductor model developed by Alcoa, which is what PLS CAD and SAG 10 use.

IEEE 2870

IEEE 2870 (1 of 3)

IEEE 2870 Grip Test Method Guide for Fittings of High-Temperature, Low-Sag Overhead Conductor Under Tension and Electric Current Co-effect – released in 2022

- The T&D Committee SCR to the entity working group submitted 91 comments, of which 58 were accepted.
 - The comments significantly changed the document in what was supposed to be a procedural review.
- NEETRAC submitted 83 comments over three ballots, of which 56 were accepted.
- Through balloting process, only one comment (editorial) was submitted by another entity.

IEEE 2870 (2 of 2)

- Several disagreements with ANSI C119
 - Requires relative humidity measurements during grip test
 - Requires wind speed measurements
 - No one expects composite core conductors to pass.
 - Appears to be based on a single test with ACAR conductor.

IEEE 2871

IEEE P2871 (1 of 3)

IEEE 2871 Standard for Wedge-shaped Groove Clamps

- Initial ballot on August 14th
 - NEETRAC Vote: Disapproved with 92 comments
 - 40 accepted, 32 revised, & 20 rejected
 - Contributions from multiple NEETRAC members
- First recirculation ballot
 - NEETRAC Vote: Disapproved with 14 technical comments
 - 9 accepted, 1 revised, & 4 rejected
- Second recirculation ballot
 - NEETRAC Vote: Disapproved with 0 comments
- Through balloting process, only one comment (editorial) was submitted by another entity.

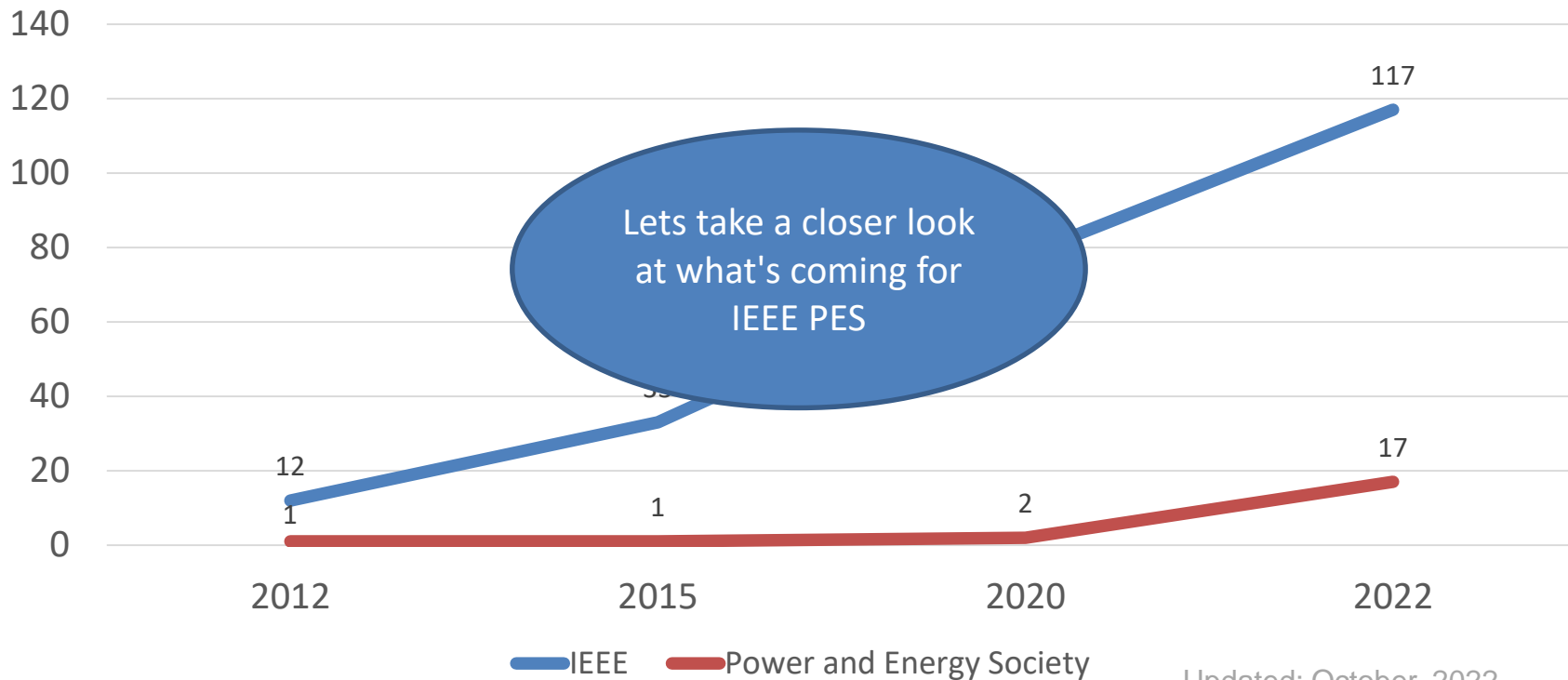
IEEE P2871 (2 of 2)

- The language is difficult to interpret / understand.
- Seven references to IEC 61284 (appears to be very similar).
 - They use significant graphics from IEC 61284
- IEEE 2870 requires end-users test the resistance of each connector following installation.
 - Laboratory research has shown that initial resistance is not a valid predictor of connector reliability or service life. Most connectors require several thermal cycles before the resistance is stable.
- Includes production testing for manufacturers that doesn't make sense.

Entity Standards

Entity Standards in IEEE

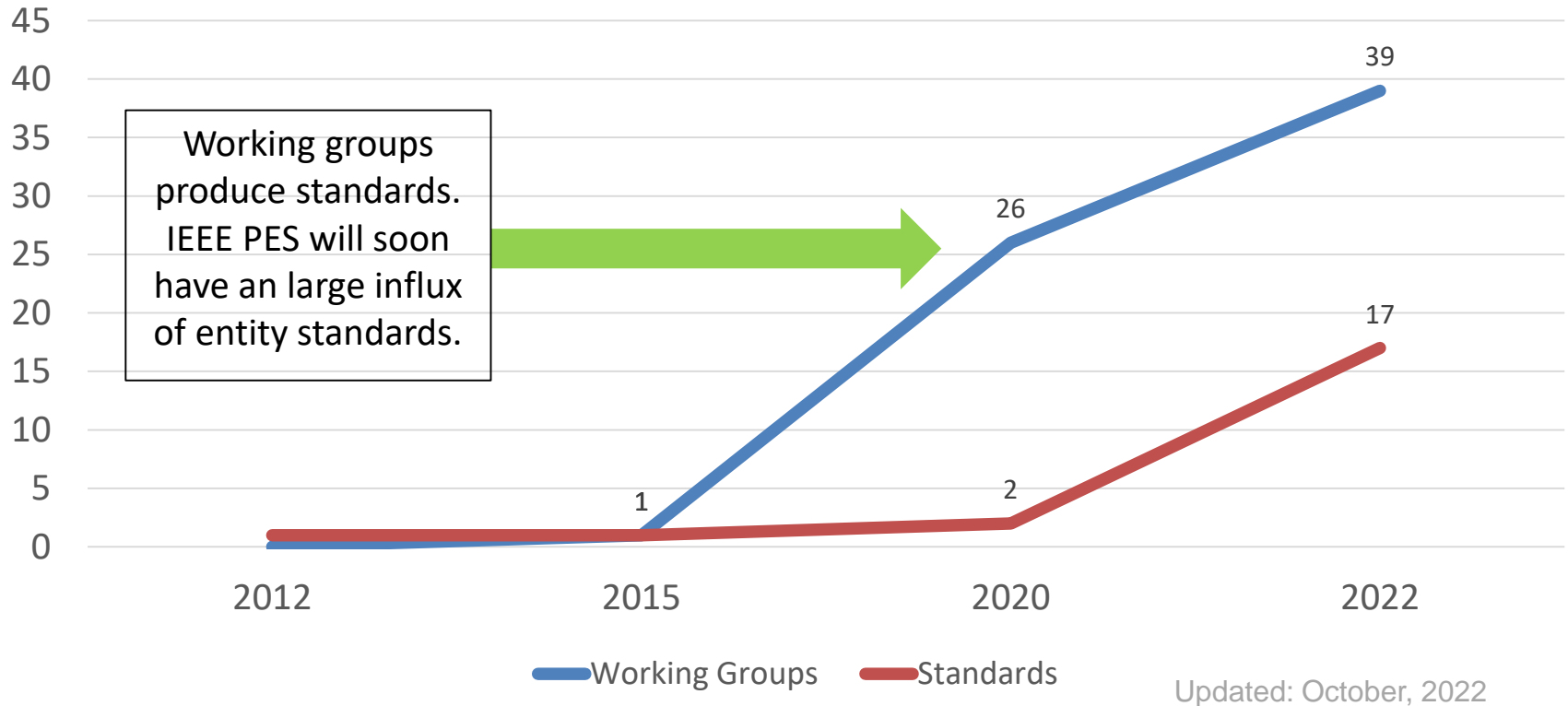
Upward Trend of IEEE Entity Standards



Updated: October, 2022

Entity Standards in Power and Energy Society

IEEE Entity Working Groups and Standards



Entity Working Groups in PES

- Examples of entity working groups in the Power and Energy Society:
 - P2810 Guide for Field Dielectric Enhancement of Polyethylene and Cross-linked Polyethylene Power Cables
 - P2833 Guide for Overhead Transmission Lines with Composite-Insulated-Crossarm Supports
 - P2974 Guide for System Commissioning of Medium and Low (750 V to ± 50 kV) Voltage Direct Current Distribution Network
 - P3133 Guide for Direct Current (DC) Ice-Melting Technology of Overhead Transmission Lines
 - P3134 Guide for Drawing Regional Icing Maps for Overhead Transmission Lines

Entity Standards in PES

- Examples of entity standards in the Power and Energy Society:
 - IEEE 1870 Approved Guide for the Parameter Measurement of AC Transmission Lines
 - IEEE 2747 IEEE Guide for Energy Efficiency Technology Evaluation of Electric Power Fittings
 - IEEE 2772 Standard for Test Method for Energy Loss of Overhead Conductor
 - IEEE 2821 Guide for Unmanned Aerial Vehicle-Based Patrol Inspection System for Transmission Lines

Publication of Domestic Chinese Standards

According to ANSI in China Newsletter Issue No. 19, China seeks to transform dominant domestic technical standards into international standards. The Chinese government's 2021 Five Year Plan includes a 85% conversion rate of domestic standards to international standards by 2035.

*NEETRAC's experience on IEEE 2870 and 2871 seems to confirm this statement.

The Real Difference

- Individual working groups publicly announce their meetings years in advance. Any IEEE member can show up and participate.
 - Feedback from any individual or individual working on behalf of an entity must be considered by the working group.
- Individual working groups include many retirees and participants with a diversity of experiences.
- This is very much an open process.

The Real Difference

- Practically speaking entity standards are being developed rapidly (2-4 years).
- While individuals can attend Entity Working Group meetings
 - You need to be very active in IEEE myProject
 - Individuals may speak at the discretion of the WG Chair
 - The Entity Working Group has no obligation to consider individual comments.
- Representatives are hand picked by corporations.
- This is very much a closed process.

The Real Difference

- Entity
 - Developed for systems topologies on another continent
- Individual
 - Developed for system topologies in North America
- We recommend using standards developed by engineers with
 - Experience with your systems topologies
 - Knowledge of regional regulations
 - Similar values (eg safety, individual vs collective processes)

How to Tell the Difference

- How do you tell the difference between the two?

IEEE SA
STANDARDS
ASSOCIATION

IEEE Standard for
IEEE Power and Energy Society

Developed by the
Transmission and Distribution Committee

Developed by the
Transmission and Distribution Committee

IEEE SA
STANDARDS
ASSOCIATION

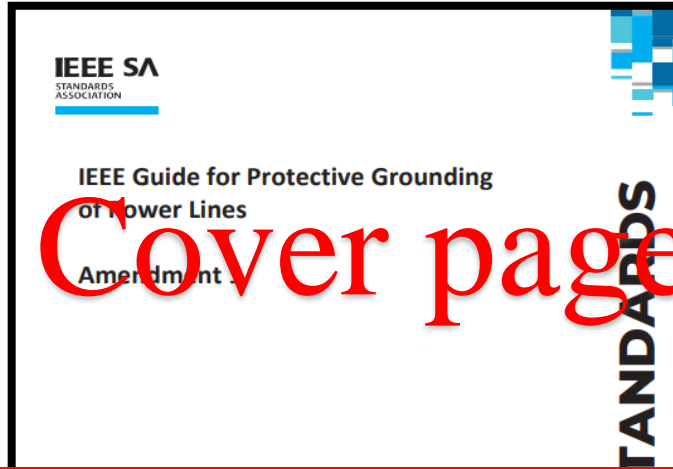
IEEE Guide for Overhead AC
Transmission Line Design

IEEE Standards Association

Developed by the
Corporate Advisory Group

STANDARDS

Individual vs Entity



Developed by the
Transmission and Distribution Committee

Developed by the
Transmission and Distribution Committee



Individual Participant Page

Subcommittee working group does not say “individual” or “entity”

Participants

At the time this IEEE guide was completed, the **Temporary Protective Grounding Working Group** had the following membership:

Clayton King, Chair

Keith Wallace, Vice Chair

Edward Hunt
Alan Holloman
Christopher Kasiewicz
Norbert Kilroe
Jeff Laninga
Joe Love

Charles Stinnett Jr.
Samuel Stonerock
Eric Surmanis
Steve Theis
James Tomaseski
Janos Toth

Information
on page 6!

Marcia Eblen

Individual Participant Page

The following members of the individual balloting committee voted on this guide. Balloters may have voted for approval, disapproval, or abstention.

William Ackerman

Ali Al-Awadi

Information
on page 6!

Mark Bushnell

William Byrd

Robert Christman

Garv Donner

Raymond Hill

Werner Hoelzl

Edward Hunt

Gael Kennedy

Yuri Khersonsky

Morteza Khodaie

Chad Kiger

Clayton King

James Kinney

J. Koepfinger

Jim Kulchisky

Saumen Kundu

Percy Pool

Douglas Proctor

Reynaldo Ramos

Keith Reese

Michael Roberts

Jesse Rorabaugh

Thomas Rozek

Bartien Sayogo

Dennis Schlender

Charles Shaw

Stephen Shull

James Smith

Entity Participant Page

Participants

At the time this guide was completed, the Fittings of Thermal-Resistance Conductor Working Group had the following entity membership:

Zhoulong Zhou, Chair
Hong Ying, Vice Chair
Ge Zheng, Secretary

<i>Organization Represented</i>	<i>Name of Representative</i>
China Datang Corporation	Feng Liu
China Jiliang University	Pengyue Zhang
Far East Smarter Energy, Co., Ltd.	Jing Xu
Gulifa Group Co., Ltd.	Zhe Zheng
Hogn Electric Group Co., Ltd.	Boyang Lin
Jiangsu Jiameng Electrical Equipment Co., Ltd.	Xiaofeng Shi

Information
on page 7!

Entity Participant Page

The following members of the entity Standards Association balloting group voted on this guide. Balloters may have voted for approval, disapproval, or abstention.

0xSenses Corporation
China Jiliang University
Far East Smarter Energy Co.,
Ltd.
Georgia Institute of Technology
Gulifa Group Co., Ltd.
Hongguang Electric Group Co.,
Ltd.

Jiangsu Jiameng Electrical
Equipment Co., Ltd.
North China Electric Power
University
Phoenix Electric Power Co., Ltd.
Shanghai Jiaotong University
Southwest Jiaotong University

State Grid Corporation of China
(SGCC)
Tianjin University
Yonggu Group Corporation Co.,
Ltd.
Zuoyi Power Equipment Co.,
Ltd.

Information
on page 8!

How Can You Help

- Review authorship details on standards prior to implementation.
- If you serve on an IEEE Technical Subcommittee Working Group
 - When revising or creating standards and guides, lobby for language be placed in the abstract that indicates:

This standard/guide was developed by engineers whose primary experience includes the design, construction and operation of electric transmission and distribution systems based in North America. The contents of this standard/guide take national regulatory requirements into consideration, and references other applicable national and international standards.

How Can You Help

- If you are a PES technical committee leader, we recommend you lobby against and vote against your PES technical committee sponsoring entity standards.
 - Standards development will occur in the Corporate Advisory Group (CAG), which will make differentiating between entity and individual standards easier.
 - Technical committee sponsorship
 - is indicated on the standards cover sheet and conveys an air of approval and technical oversight
 - Technical committee only has procedural oversight, and practically speaking no actual influence
 - distracts members from working on individual standards

Questions?

Get the word out!

Questions?

Questions

For More Information

- You can contact NEETRAC for more information
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 - tristen.cline@neetrac.gatech.edu