



**Memorandum of Understanding (“MOU”)
General Cooperation Agreement
Between**

North American Electric Reliability Corporation

and

The Institute of Electrical and Electronics Engineers, Inc.

(each, a “Party” or together, “Parties”)

I. SIGNATORIES

The North American Electric Reliability Corporation (“NERC”) is a not-for-profit international regulatory authority whose mission is to assure the reliability of the bulk power system in North America. NERC develops and enforces Reliability Standards; annually assesses seasonal and long-term reliability; monitors the bulk power system through system awareness; and educates, trains, and certifies industry personnel. NERC’s area of responsibility spans the continental United States, Canada, and the northern portion of Baja California, Mexico. NERC is the electric reliability organization for North America, subject to oversight by the Federal Energy Regulatory Commission and governmental authorities in Canada. NERC’s jurisdiction includes users, owners, and operators of the bulk power system, which serves more than 334 million people.

The Institute of Electrical and Electronics Engineers, Inc. is the world’s largest engineering society with members in over 160 countries and focuses on advancing the theory and practice of electrical, electronics, and computer engineering, computer science, and related technologies.

The IEEE Standards Association (“IEEE-SA”) is a global standardization body within the IEEE comprised of individual and corporate members and other contributing technologists, who develop consensus-based electro-technical, electronic, information and communication technology standards affecting a broad market base. The IEEE-SA provides a standards program that serves the global requirements of industry, government, and the public. The IEEE-SA is the only body that can speak for IEEE in the area of standardization.

II. PURPOSE

IEEE and NERC have the common objective to perform and promote, directly or indirectly, regional and international standardization.

IEEE and NERC have a reciprocal interest in gaining knowledge about the activities of the other organization, which may facilitate cooperation on items of common interest. IEEE and NERC have noted the necessity of structuring and strengthening their relationship and fostering a closer cooperation.

Therefore, IEEE and NERC establish this MOU with the following goals:

1. Encourage communication between the two organizations;
2. Promote shared knowledge of the standards development activities of each organization; and
3. Facilitate liaisons between each other's technical groups and other cooperation where possible.

III. SPECIFIC COLLABORATIVE ACTIVITIES

- A. IEEE and NERC may exchange from time to time as they may agree, free of charge, information in areas of mutual interest.
- B. Both Parties agree to exchange information on the specific standards and development activities contemplated under this MOU or as may be expanded by the Joint Operating Committee, as well as the other collaborative and coordination activities provided for under this MOU. IEEE will send the *IEEE-SA Newswire*, which includes information on IEEE standards activities, and other relevant newsletters, to an identified NERC contact.
- C. Liaisons will be appointed by IEEE and NERC. These liaisons will serve as the focal point for all interactions between the two organizations. As of the date of this MOU, the liaisons are as follows:

IEEE –Bill Ash, Herman Koch

NERC –Director of Reliability Assessment and System Analysis (John Moura)

Each organization shall notify each other in writing should any of the contacts above change.

- D. NERC and IEEE may identify and link leaders/stakeholders/technical experts with each other's technical committees and help promote direct active participation therein.

IEEE PES has created the Policy Technical Support Task Force to provide support to and cooperate with governments and regulatory organizations globally on technical issues. Cooperation Task Team 1 focuses on Standards and Interoperability with a goal to support grid modernization and improve communications and interoperability through timely development of standards. Their objective is to identify appropriate committees and resources to support NERC and IEEE joint initiatives. IEEE PES Task Team Leads are John McDonald and Doug Houseman. In addition, IEEE PES Governing Board has appointed Herman Koch as Member-at-Large for Standards. Furthermore, IEEE PES works closely with IEEE SA to coordinate work with other government entities, such as DOE.

The Parties shall create a Joint Operating Committee comprised of three (3) NERC and three (3) IEEE members. The Joint Operating Committee shall meet at a minimum of twice (2) annually to adopt a work plan for the given year and identify the key issues that will be addressed by IEEE and NERC.

The IEEE Power & Energy Society (PES) will be represented on the Joint Operating Committee and coordinate the IEEE Technical Support of this MOU through the IEEE Power & Energy Society (PES) Policy and Regulatory Technical Support Task Force.

- E. The work plan should include items related to coordinating activities, developing joint goals, setting expectations, and targeting key issues. The work plan will include task items for completion over the course of the year, as well as longer-term items to maintain strategic alignment.

Other Provisions

- A. This MOU is not a commitment of financial resources. Any resource commitment will be negotiated, documented, and committed separately between the Parties, and in advance of the actual expenditure. Except as otherwise agreed to and documented in writing, each Party will be responsible for their own costs related to its participation in this MOU.
- B. This MOU is not intended to grant adoption and/or translation rights to either Party. In the event that either Party would seek to receive such rights, a separate agreement may be negotiated

IV. KEY OBJECTIVES AND ACTIVITIES

The following key objectives and activities were identified during the development of this MOU and should serve as a starting point to facilitate the Joint Operating Committee's Work Plan. IEEE and NERC agree to cooperate in the following specific work areas, and may expand cooperative efforts as agreed to in the future:

- 1. **NERC and IEEE Standards Coordination**
 - a. References to IEEE technical documents in developing NERC Reliability Standards when appropriate to avoid duplication of effort, to ensure coordination

between NERC's and IEEE's Standards, as contemplated by this MOU, with proper attribution and agreement given.

2. NERC and IEEE Power & Energy Society (PES)

- a. Active and coordinated NERC engagement within PES
- b. NERC to participate in PES Technical Council Meetings and support coordination with the PES Governing Board and PES Staff as needed

3. NERC System Protection Initiative

- a. NERC Technical Guideline – Considerations for Power Plant and Transmission System Protection Coordination (Revision 2, collaboration with IEEE Power Systems Relaying Committee (PSRC))

4. NERC Frequency Response Initiative

- a. Annual frequency response analysis
- b. Industry engagement on frequency response fundamentals including involvement in PES panels or workshops on frequency response
- c. System analysis and modeling techniques
- d. Frequency response and distributed energy resources

5. NERC Modeling Improvements Initiative

- a. Dynamic load modeling, modeling practices, load model validation
- b. Fault-Induced Delayed Voltage Recovery (FIDVR)
- c. Power plant model validation
- d. System model validation
- e. Turbine and boiler controls modeling
- f. Standardized Component Model Library
- g. Mid-term dynamics modeling
- h. Renewable energy system modeling (wind, solar, battery storage, etc.)

6. System Analysis & Wide-Area Reliability Topics

- a. Wide-area system analysis including transient stability, small signal stability, and voltage stability
- b. Wide area measurement system (WAMS)
- c. Essential Reliability Services (ERS)
- d. Sub-Synchronous Resonance (SSR) and Sub-Synchronous Control Interaction (SSCI)
- e. Probabilistic generation and transmission assessment techniques
- f. Integration of variable energy resources into weak grids

**7. IEEE Technical Equipment Standards/Guides and Certification Programs—
Operating parameters**

- a. GMD equipment effects – NERC GMD Standards/transformer specifications/etc.
- b. IEEE C37.118.1 - Synchrophasor Measurements for Power Systems

- c. IEEE Synchrophasor Certification Program
- d. IEEE 1547- IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems
- e. IEEE 1547.1 Conformity Assessment Steering Committee Accelerated Deployment Effort (CASCADE)
- f. IEEE C37.111 - Measuring relays and protection equipment – Part 24: Common format for transient data exchange for power systems (COMTRADE)
- g. IEEE C37.232 – Common Format for Naming Time Sequence Data Files (COMNAME)
- h. IEEE 1588 Profile for Power Application based on IEEE C37.238
- i. IEEE 1110 – Guide for Synchronous Generator Modeling Practices and Applications in Power System Stability Analyses
- j. IEEE 421.5 – Recommended Practice for Excitation System Models for Power System Stability Studies
- k. IEEE 2030.1.1 eV Charging

8. Cyber Security Requirements

- a. IEEE C37.240 - Cyber Security Requirements for Substation Automation, Protection and Control Systems

V. NOTICES

The Parties may issue press releases and other publicity regarding this MOU, provided that such materials are provided to, and approved in writing by, the other Party prior to release.

Any and all notices shall be in writing, sent by registered or certified mail, return receipt requested, addressed to the Parties at their respective addresses specified below, and are effective when mailed. Alternately, an email, a facsimile transmittal, or an express mail transmittal with a confirmation of receipt shall be acceptable. Either Party, by notice, may specify a different address.

If to NERC: North American Electric Reliability Corporation
 3353 Peachtree Road N.E. Suite 600,
 North Tower
 Atlanta, GA 30326
 Attention: John Moura, Director of Reliability Assessment
 (404) 446-2560 (phone)

If to IEEE: The Institute of Electrical and Electronics Engineers, Inc.
 Standards Activities

445 Hoes Lane
Piscataway, NJ 08854
United States
Attention: Bill Ash, Strategic Technology Program Director
Tel: (732) 465-5828
Fax: (732) 562-1571

VI. TERM

This MOU shall remain in effect until terminated by one of the Parties in accordance with Section VII below. IEEE and NERC agree to formally review this MOU every two (2) years to ensure the stated goals set forth in Sections II, III, and IV of the MOU are being achieved

VII. TERMINATION

This MOU may only be terminated as follows:

- a) Either Party may terminate this MOU upon thirty (30) days' prior written notice; or
- b) By written mutual agreement of the IEEE and NERC.

Upon termination or expiration of this MOU, all the rights granted pursuant to this MOU shall cease immediately and the Parties shall cease from distributing any information received pursuant to this MOU. Notwithstanding anything in this MOU or otherwise to the contrary, the provisions of this MOU related to ownership of rights shall survive any termination or expiration of this MOU.

VIII. CONTENTS OF MOU

The signatories hereto understand and agree that this MOU constitutes the complete agreement between Parties, supersedes all prior agreements with respect to the subject hereof, and may not be amended or modified, except by written instrument signed by all Parties hereto or by their duly authorized representatives.

IX. GOVERNING LAW

This MOU shall be construed in accordance with the laws of the State of New York, without giving effect to its conflict of laws provisions, and the Courts of New York shall be the forum for settlement of any dispute.

X. SEVERABILITY

The terms and conditions of this MOU are severable. If any condition of this MOU is deemed to be illegal or unenforceable under any rule of law, all other terms shall remain in force. Further, the term and condition which is held to be illegal or unenforceable shall remain in effect as far as possible and in accordance with the intention of the Parties.

XI. FORCE MAJEURE

Neither Party shall be responsible for any delay nor failure in performance resulting from acts entirely beyond its control.

XII. INDEPENDENT CONTRACTORS

The relationship between the Parties shall be that of independent contractors, and nothing in this MOU shall be construed to constitute either Party as an employee, agent or member of the other Party. Without limiting the foregoing, neither Party shall have authority to act for or to bind the other Party in any way, to make representations or warranties or to execute agreements on behalf of the other Party, or to represent that it is in any way responsible for the acts or omissions of the other Party.

XIII. THIRD PARTY BENEFICIARIES

Nothing in this MOU, whether expressed or implied, is intended to confer any rights or remedies under or by reason of this MOU on any persons other than the Parties to this MOU and to their respective successors and assigns.

XIV. COUNTERPARTS

This MOU may be executed in one or more counterparts, each of which when so executed and delivered shall be deemed an original, but all of which together shall constitute one and the same instrument, and a signature page sent by facsimile or digital copy shall be deemed to be the equivalent of an original.

XV. CONFIDENTIALITY

1. NERC and IEEE shall keep confidential to the extent permitted by law information shared under this MOU, requests made under this MOU, the contents of such requests, and any other matters arising under this MOU.
2. Except where disclosure is required by law, the requesting party will obtain the prior consent of the disclosing party, not to be unreasonably withheld, before disclosing non-public information received under this MOU to any non-signatory to this MOU.
3. Where required by law, the requesting party will notify the disclosing party of any legally enforceable demand for non-public information furnished under this MOU. Prior to compliance with the demand, the requesting party will assert all appropriate legal exemptions or privileges with respect to such information as may be available.

XVI. ASSIGNMENT

Neither Party may assign this MOU or any of its rights, obligations or duties hereunder, without the prior written consent of the other Party.

Dated:

10/20/16

Signature:



Konstantinos Karahalios
IEEE-SA Managing Director

IEEE
(The Institute of Electrical and Electronics Engineers, Inc., acting through the IEEE Standards Association)
445 Hoes Lane
Piscataway, NJ 08854
US

<http://standards.ieee.org>

Dated:

10/14/14

Signature:



Mark Lauby
Senior Vice President and Chief Reliability Officer
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