



KINECTRICS

NERC Engineering Services

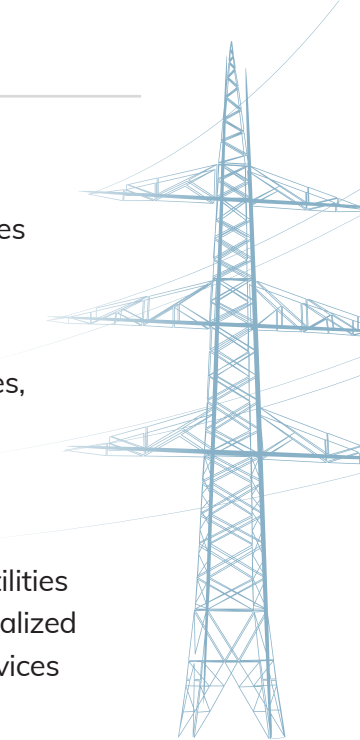


Overview

All bulk power system owners and operators, including generators and transmission utilities must comply with the North American Electric Reliability Corporation (NERC) reliability standards. NERC develops and proactively works with the various regional entities to enforce the reliability standards in the six North American region including IESO, WECC, MRO, NPCC, Texas RE, SERC, RF and SPP.

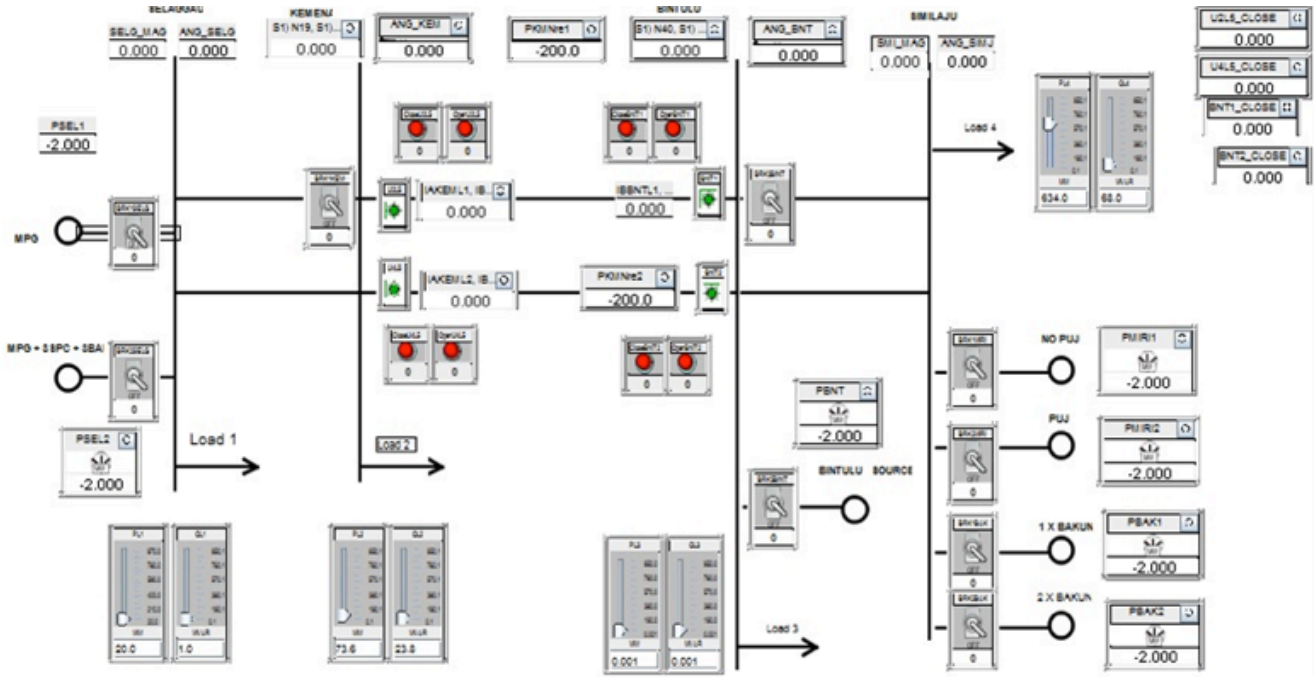
This is carried out by way of annual assessments, seasonal and long-term reliability studies, as well as monitoring the bulk power system through system awareness. There is some discussion of the potential in the near future to have the electric distribution system also included in the overall reliability mandate of meeting relevant NERC standards.

Kinectrics provides a suite of services including Kinectrics' power projects for supporting utilities to comply with NERC regulatory standard. Kinectrics Power system study experts are specialized in power system studies, model development, field testing, and model validation. These services are provided for both conventional generation as well as renewable energy resources.



Power System Analysis

NERC compliance in the space of Protection and control is carried out entirely in house by Kinectrics using our state-of-art software modules supported by our system verification lab and RTDS (Real Time Digital Simulator) led by experts with decades of experience in this field.



Kinectrics RTDS, system verification Lab

Kinectrics is committed to staying abreast of upcoming developments and changes in NERC standards and the BES landscape. Kinectrics is uniquely suited to this both by our involvement in reliability standards committees but also by our hands-on knowledge of the assets and systems involved. Our labs and field-testing services have been relied on by utilities for decades to give them the most accurate picture of their systems as well as troubleshoot and resolve unknown phenomena in their systems.



Kinectrics Field Testing Services

Kinectrics offers solutions and services for many such NERC compliance needs including support to ensure proper plant parametrization model validation, protection performance, fault analysis as well as advanced power system modeling support and advanced modeling and simulation support.

Focus areas are the MOD, PRC and CIP series of NERC standards.

Our team has specialists in Canada and US and are well versed in the requirements of the standards by virtue of our involvement in stakeholder groups such as RSSC (Reliability Standards Standing Committee) held by IESO as well as years of experience offering such services to the generation, transmission and distribution utilities.

NERC Standard

NERC Standard	Title	Background Information
MOD-025-2	Verification and Data Reporting of Generator Real and Reactive Power Capability and Synchronous Condenser Reactive Power Capability	Kinectrics can support to ensure accurate information on generator gross and net Reactive Power capability is available for steady-state models used to assess Bulk Electric System reliability.
MOD-026-1	Verification of Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions	Recent Project Experience: Verification of dynamic and load flow model of generator, excitation and control system of conventional combined power cycle power plant.
MOD-027-1	Verification of Models and Data for Turbine/Governor and Load Control or Active Power/Frequency Control Functions	Recent Project Experience: Verification of dynamic and load flow model of Gas and Steam Turbines, governor and load control system.
MOD-032-1	Data for Power System Modeling and Analysis	Kinectrics can support to establish consistent modeling data requirements and reporting procedures for development of planning horizon cases necessary to support analysis of the reliability of the interconnected transmission system.
MOD-033-1	Steady-State and Dynamic System Model Validation	Recent Project Experience: Verification and validation of generator, excitation, Turbine and control system based on test performed at site on the combined cycle power plant.
PRC-001-1.1(ii)	System Protection Coordination	Kinectrics can provide calculations to support Transmission Service Providers in order to maintain awareness of available transmission system capability, future flows on their own systems as well as their neighbors.
PRC-002-2	Disturbance Monitoring and Reporting Requirements	The main drive behind this standard to have adequate data available to facilitate analysis of Bulk Electric System (BES) Disturbances. Kinectrics support customers for any local DER record analyses and report preparation.
PRC-004-5(i)	Protection System Misoperation Identification and Correction	Kinectrics support client to identify and correct the causes of Misoperations of Protection Systems for Bulk Electric System (BES) Elements.
PRC-004-WECC-2	Protection System and Remedial Action Scheme Misoperation	Kinectrics can support the utility to meet the standard to ensure all transmission and generation Protection System and Remedial Action Scheme (RAS) Misoperations are analyzed and/or mitigated.
PRC-005-1.1b	Transmission and Generation Protection System Maintenance and Testing	Kinectrics can support to ensure all transmission and generation Protection Systems affecting the reliability of the Bulk Electric System (BES) are maintained and tested.
PRC-005-6	Protection System, Automatic Reclosing, and Sudden Pressure Relaying Maintenance	Kinectrics can provide support to document and implement programs for the maintenance of all Protection Systems, Automatic Reclosing, and Sudden Pressure Relaying affecting the reliability of the Bulk Electric System (BES).

NERC Standard

PRC-006-3	Automatic Underfrequency Load Shedding	Kinectrics can provide support to establish design and documentation for automatic underfrequency load shedding (UFLS) to meet regulatory requirement.
PRC-010-2	Undervoltage Load Shedding	Kinectrics can support to establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs (UVLS Programs).
PRC-011-0	Undervoltage Load Shedding System Maintenance and Testing	Kinectrics can support to provide system preservation measures in an attempt to prevent system voltage collapse or voltage instability by implementing an Undervoltage Load Shedding (UVLS) program.
PRC-016-1	Remedial Action Scheme Misoperations	Kinectrics can provide support, analyze, and mitigate the remedial action misoperation.
PRC-017-1	Remedial Action Scheme Maintenance and Testing	Kinectrics can provide support to ensure that all Remedial Action Schemes (RAS) are properly designed, meet performance requirements, and are coordinated with other protection systems.
PRC-018-1	Disturbance Monitoring Equipment Installation and Data Reporting	Kinectrics can provide support to ensure that Disturbance Monitoring Equipment (DME) are design selected and installed and Disturbance data is reported in accordance with regional requirements.
PRC-019-2	Coordination of Generating Unit or Plant Capabilities, Voltage Regulating Controls, and Protection	Recent Project Experience: Coordinating protection relay setting of conventional generating facility with the equipment capability.
PRC-023-4	Transmission Relay Loadability	Kinectrics can provide support for transmission facility owner to coordinate the load sensitive Protective relay settings with transmission loadability limit.
PRC-024-2	Generator Frequency and Voltage Protective Relay Settings	Recent Project Experience: Verified conventional and alternative generation facility frequency and voltage elements for any eventual excursions.
PRC-025-2	Generator Relay Loadability	Recent Project Experience: Verified the conventional generating facility the load sensitive protection settings elements with the load-ability limit.
PRC-026-1	Relay Performance During Stable Power Swings	Kinectrics can support the utility to ensure that load-responsive protective relays are expected to not trip in response to stable power swings during non-Fault conditions.
CIP-002-5.1a	Cyber Security — BES Cyber System Categorization	Recent Project Experience: CIP-002-5.1a replaced CIP-002-5.1BES Categorization, i.e. Low, Medium High Impact BES Digital asset scope development in compliance with CIP-002-2 for Low Impact Nuclear Power Plants
CIP-003-8	Cyber Security — Security Management Controls	Recent Project Experience: Development of BES CIP Required management plan for Low Impact Nuclear Power Plants.

NERC Standard

CIP-004-6	Cyber Security — Personnel & Training	<p>Recent Project Experience: To minimize the risk against compromise that could lead to misoperation or instability in the Bulk Electric System (BES) from individuals accessing BES Cyber Systems by requiring an appropriate level of personnel risk assessment, training, and security awareness in support of protecting BES Cyber Systems.</p>
CIP-005-5	Cyber Security — Electronic Security Perimeter(s)	<p>Recent Project Experience: To manage electronic access to BES Cyber Systems by specifying a controlled Electronic Security Perimeter in support of protecting BES Cyber Systems against compromise that could lead to misoperation or instability in the BES.</p>
CIP-006-6	Cyber Security — Physical Security of BES Cyber Systems	<p>Recent Project Experience: Key to manage physical access to Bulk Electric System (BES) Cyber Systems by specifying a physical security plan in support of protecting BES Cyber Systems against compromise that could lead to misoperation or instability in the BES.</p>
CIP-007-6	Cyber Security — System Security Management	
CIP-008-5	Cyber Security — Incident Reporting and Response Planning	
CIP-009-6	Cyber Security — Recovery Plans for BES Cyber Systems	
CIP-010-2	Cyber Security — Configuration Change Management and Vulnerability Assessments	<p>Recent Project Experience: Experience in designing systems that prevent and detect unauthorized changes to Nuclear Power Plant Systems by specifying configuration change management and vulnerability assessment requirements in support of protecting Cyber Systems from compromise.</p>
CIP-011-2	Cyber Security — Information Protection	<p>Recent Project Experience: Experience in design and development of systems to provide effective cyber security protection to prevent unauthorized access to Nuclear Power Plant.</p>



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