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Reliability Standards

Herb Schrayshuen
Vice President and Director of Standards

August 4, 2011

to ensure the reliability of the bulk power system

Standards Actions and Discussion

- 5a Transmission Planning Standard – Approve
- 5b Reliability Coordination Project 2006-06
  - IRO-002-3 - Approve
  - IRO-005-4 - Approve
  - IRO-014-2 - Approve
- 5c Discussion of selected standards in process
  - FAC-003 Vegetation Management
  - TPL-002 footnote b
  - CIP-002-4

5a. Transmission Planning Standard

TPL-001-2 — Transmission System Planning Performance Requirements

- Foundational standard for annual planning assessments conducted by Planning Coordinators/Transmission Planners
- Includes **significant** revisions and improvements relative to current set of enforceable requirements
- Replaces approved versions of TPL-001 through TPL-006

TPL-001-2
Highlights of new standard

- Adds specificity to data requirements and modeling conditions
- Requires annual assessment addressing near-term and long-term planning horizons for steady state, short circuit, and stability
- Requires sensitivity studies
- Addresses impact of entity's spare equipment strategy
- Requires criteria for acceptable voltage limits and deviations, criteria used for analysis of instability
- Includes requirements to facilitate peer review

TPL-001-2
Order 693 Directives

Standard responds to 25 directives

- 22 responses match directives
- Three provide equally efficient and effective solutions
- Footnote ‘b’ solution included in TPL-001-2

Project 2006-06 – Reliability Coordination

- Project purpose: *Revise set of Reliability Coordination standards*
  - Retire redundant requirements
  - Retire basic capability/facility requirements
  - Retire lower level facilitating requirements
  - Retire requirements not needed for reliability
  - Rearrange requirements between standards
  - Add clarity, where needed for remaining requirements

5b. Project 2006-06 – Reliability Coordination

- Support for retiring requirements:
  - Collecting/retaining evidence to demonstrate basic capabilities (e.g., exchanging data) remain in place throughout operating day 24/7 for three years is onerous
  - Basic capability requirements already verified for all Reliability Coordinators
    - Either through certification or readiness audit
  - Basic capability/facility requirements measured continuously through other performance-based requirements (e.g., conduct analyses using exchanged data)

5b-1. Project 2006-06 Reliability Coordination

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IRO-002-3 – Reliability Coordination – Analysis Tools

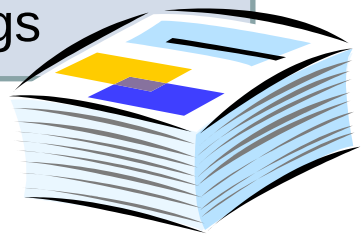
- Proposes retirement of six IRO-002-2 requirements:
  - Basic facility requirements (3)
  - Lower level facilitating requirements (3)

IRO-002-3 Proposes Two Requirements

Requires Reliability Coordinators to:

- Provide System Operators with authority to approve, deny, or cancel planned outages of own analysis tools
- Have procedures to mitigate effects of outages of analysis tools

Need Based on August 2003 Blackout Findings



IRO-002-3
Order 693 Directives

One directive: Make minimum set of tools available to Reliability Coordinator's System Operators

- Two aspects to directive:
  - Ensure system operators have minimum set of tools
    - (Addressed in Project 2009-02 – Real-time Monitoring and Analysis Capabilities)
  - Ensure system operators have control over their tools
    - Addressed in proposed IRO-002-3

IRO-002-3
Unresolved Minority Issue

- Recommendation to retire requirement giving System Operators veto power over analysis tool outages
  - Need to control tools related to blackout findings; proposed requirement addresses part of a FERC Order 693 directive

5b-2. Project 2006-06 Reliability Coordination

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IRO-005-4 - Reliability Coordination — Current Day Operations

- Proposes retirement of 11 IRO-005-3a requirements
  - Redundant with other requirements (7)
  - Lower level facilitating requirements (3)
  - Not needed for reliability (1)

IRO-005-4
Proposes Subdividing Remaining Requirement

- Requires Reliability Coordinator to notify its Transmission Operators and Balancing Authorities when:
  - Study or analysis shows Adverse Reliability Impact (actual or anticipated)
  - Adverse Reliability Impact has been mitigated
- *Ensures key operating entities have information needed to maintain situational awareness*

IRO-005-4
Unresolved Minority Issue

- Concern about retiring monitoring requirements
  - Gathering/retaining evidence for 24/7 compliance for every operating position overwhelming
  - Desired performance measured through other higher-level performance based requirements

5b-3. Project 2006-06 Reliability Coordination

IRO-014-2 - Coordination Among Reliability Coordinators

- Combines coordination requirements from three standards (IRO-014-1, IRO-015-1, IRO-016-1)
- Includes conforming change to IRO-001-1.1
- Proposes retirement of five requirements
  - Administrative (2)
  - Redundant with other requirements (2)
  - Not a requirement (1)

IRO-014-2
Eight Proposed Requirements

- Requires Reliability Coordinators to have, maintain, and follow operating procedures, processes, or plans for activities that require notification, exchange of information or coordination of actions that may impact other RC Areas (4 requirements)
- Requires Reliability Coordinators to make notifications/take actions following identification of an adverse reliability impact (4 requirements)
- *Ensures coordination between Reliability Coordinators and promotes situational awareness*

IRO-014-2
Unresolved Minority Issue

- Concern regarding retirement of requirement to operate to the most limiting/conservative parameter
  - “Most limiting/conservative” parameter language is ambiguous
  - Revised IRO-014-2 R5-R8 to address concern
  - Redundant with IRO-009-1 where R5 identifies specific actions if Reliability Coordinators disagree on an IROL

5C-1. FAC-003 Vegetation Management

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FAC-003-2 – Transmission Vegetation Management

- Initial ballot conducted July 9-19, 2010
  - Received 65.93% weighted segment approval
- Successive ballot conducted February 18-28, 2011
  - Received 79.28% weighted segment approval

FAC-003 Vegetation Management Status

- Drafting team considering/responding to comments received during successive ballot/comment period
  - Considering whether to make changes to standard
  - Developing explanations and justifications for proposed requirements at request of Standards Committee Chair
  - Goal is to determine if team has sufficient evidence to support request for regulatory approval – before standard is finalized

TPL-002 – System Performance Following Loss of a Single BES Element – Footnote b

Order No. 693 directive to clarify TPL-002-0, Table 1, footnote b, regarding planned/controlled interruption of electric supply following single contingency

- March 31, 2011 – NERC filed petition with FERC for approval of TPL standards with footnote b
- May 17, 2011 – FERC issued a data request on the filing
- June 7, 2011 – NERC filed response to data request

Footnote b Data Request

- Data request contained questions narrowly focused on approach to load loss and general use of the term “stakeholder process”
- Required a response within 21 days of receipt
- Provided no opportunity for industry comment

Footnote b Directive

- *"Based on the record before us, we believe that the transmission planning Reliability Standard should not allow an entity to plan for the loss of non-consequential load in the event of a single contingency. The Commission directs the ERO to clarify the Reliability Standard …"*

CIP-002-4 Cyber Security — Critical Cyber Asset Identification

- January 24, 2011 - Board of Trustees approved CIP Version 4 Reliability Standards
- February 10, 2011 - NERC filed petition with FERC for approval of CIP Version 4 Reliability Standards
  - Includes CIP-002-4 — the bright line test for determining Critical Assets
- April 12, 2011 - FERC issued data request soliciting additional information regarding NERC's February 10, 2011 filing

CIP-002-4
April 12, 2011 Data Request Response

- May 2, 2011 NERC issued survey needed to answer some questions in data request ("2011 Industry Survey") to all registered entities
- May 27, 2011 NERC filed response to 1st set of questions in data request
- June 30, 2011 NERC filed response to remaining questions (using data from 2011 Industry Survey)

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Planning Committee 2011-2016 Strategic Plan

Mark Lauby
Vice President and Director of Reliability Assessment and Performance Analysis

August 4, 2011

to ensure the reliability of the bulk power system

Foundation

- Key considerations:
  - Board of Trustees strategic discussions
  - Three-year ERO Performance Assessment
  - NERC's Strategic Plan
  - NERC's CEO Top Reliability Considerations
  - FERC technical conferences
- Planning Committee's alignment:
  - With NERC's strategic direction
  - With relevant reliability priorities/focus
  - Long-term sustainable view

Development Plan

- Develop PC's aligned functions and objectives
  - Consider charter changes
  - Consider organization refinements
- Sustainably communicate long term direction
- Provide clear and consistent guidance to sub-groups
- Platform for discussion with other technical committees

Development Plan

- Develop PC strategic plan
  - Review existing plan and enhance
  - Review PC Charter
  - Refine organization/structure
- Develop transition plan
  - Re-align PC Structure, sub-groups
  - Develop high level work plan

Sustained alignment with ERO enterprise strategic objectives to address reliability planning issues

Strategic Plan Outline

- Introduction
- Mission, vision and guiding principles
- Areas of strategic focus
  - Reliability assessment
  - Emerging issues and reliability concerns
  - Technical analyses
  - Standards input
  - Metrics
  - Event analysis
  - NERC Alerts
  - Guidelines and technical reports
  - Compliance input

Strategic Plan: Transition/Work Plan

- Reorganize PC subgroups around strategic work objectives
  - Unwind groups that are no longer needed
  - Reform subgroups contributing to strategic objectives
- Support NERC's standards and compliance activities
  - Technical input into NERC standards process
  - Technical review of CANs
- Support industry forums

Path Forward and Time Line

- Strategic plan and revised charter reviewed by PC in March 2011
  - Comments received and integrated
  - Draft Transition/Work Plan developed
- Approved by PC in June 2011
  - Strategic Plan
  - Revised Charter
- Transition/work plan - Approved by PC in July 2011

Request Approval from the BOT

- PC's
  - Strategic Plan
  - Revised Charter

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Question & Answer

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Mandatory Reporting of Conventional Generation Performance Data GADS

Benjamin Crisp, Vice Chair of Planning Committee and GADSTF Chair

August 4, 2011

GADS Task Force

- In June 2010, the Planning Committee (PC) impaneled a task force to evaluate the need for mandatory submission of generator availability data (GADS):
  - About 73% of the installed capacity (20 MW or larger) reports outage events to GADS
  - Currently a voluntary database
- Based on the GADS Task Force work, PC recommends mandatory data for conventional units (fossil, nuclear, combined cycle, etc.), ROP 1600

The Need For GADS Data

- New Challenges
  - As the resource mix evolves, NERC and its stakeholders need to understand how the changes in performance translates into Planning Reserve Margins
  - Understanding performance of existing and new resource technologies is essential to comprehending the reliability of the projected bulk power system in North America
  - Historical assessment can identify trend clusters suitable for further problem identification

The Need For GADS Data (cont'd)

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- Performance Analysis
  - Historical event data used to develop a severity metric risk measurement tool, establishing the bulk power system's characteristic performance curve
  - To calculate and measure both Event and Condition Driven risk, detailed event, and performance information
  - Monitoring the impact of transmission outages on generators and generator outages on transmission
  - Power plant benchmarking, equipment analysis, design characteristics, projected performance, avoid long-term equipment/unit failures, etc.

Justifications For Conventional Units

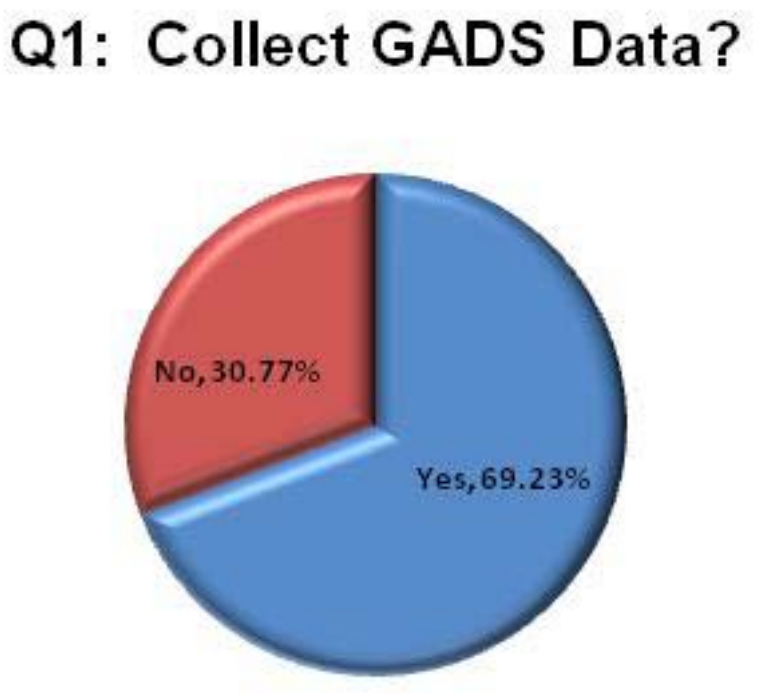
- Nearly 300 GW is not reported GADS
- Nearly 50% of new units 2000-2008 do not report
- Large amounts of hydro-pumped storage, combined cycle and gas turbines are missing
- These units are needed to analyze the reliability of the bulk power system

GADS Section 1600 Responses

- 39 Responses
  - 21 responses from Investor-Owned Utilities
  - 7 responses from Independent Power Producers
  - 3 responses from State/Municipal Utilities
  - 2 responses from Public Utility Districts
  - 2 responses from consultants
  - 2 responses from Independent System Operators
  - 1 response from a public utility commission
  - 1 response from a Cooperative Utility

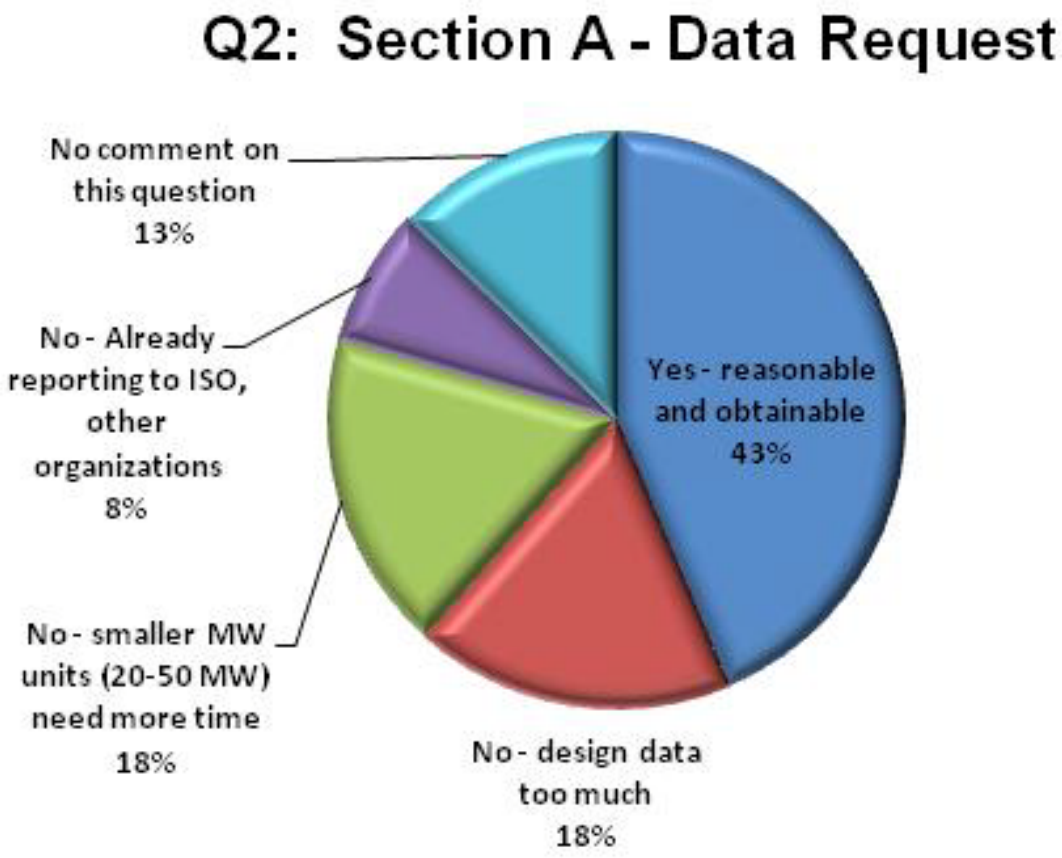
Question #1 – Report to GADS?

If you are a Generator Owner on the NERC Compliance Registry, do you currently collect Generating Availability Data System (GADS) event-, performance- and design-type information, whether you do or do not report such data to NERC? If "no", please explain.



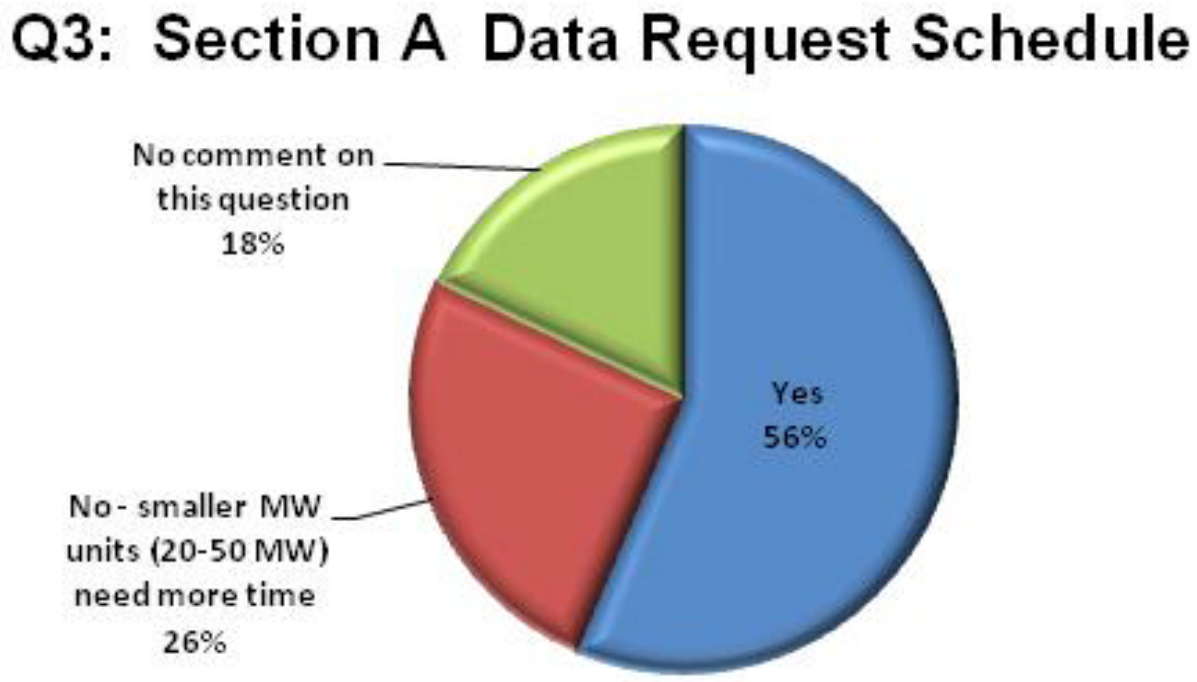
Question #2 – Data Request Reasonable and Obtainable?

Is the data being requested in Section A of this data request reasonable and obtainable? If "no", please explain.



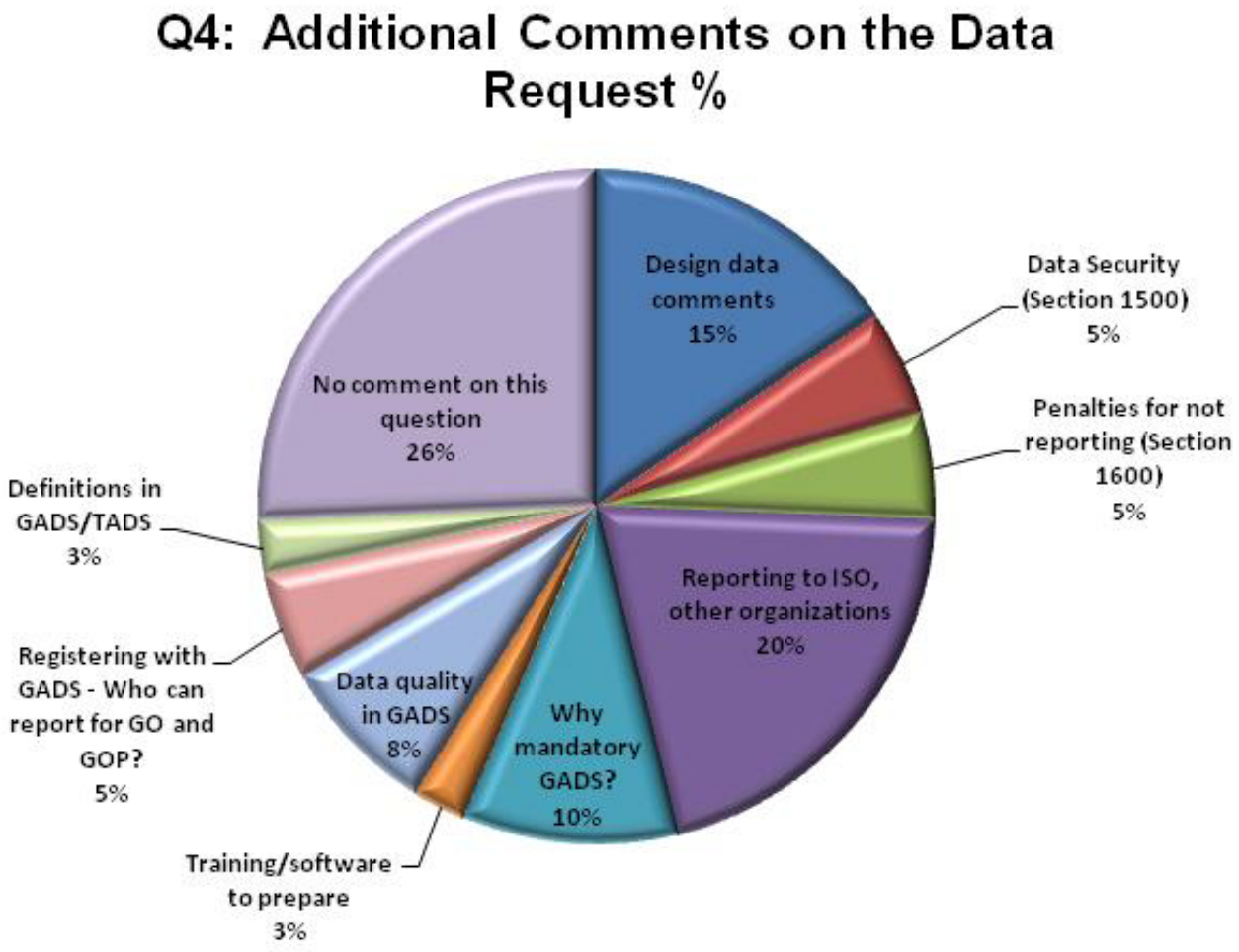
Question #3 – Schedule Reasonable?

Is the data request schedule in Section A of this data request reasonable? If "no" please explain



Question #4 – Other Comments

Please provide any other comments you may have about this data request.



Primary Concerns

- Data will be confidential under Section 1500 of the Rules of Procedure
- NERC will encourage timely data submittals as outlined in Section 1600 of Rules of Procedure
- Data for units ≥50 MW will start January 1, 2012 with the submittal of 2012 data, not 2011 data
- Design data reduced to nine data fields/unit

PC Recommended Action by BOT

- Approve a NERC Rules of Procedure, Section 1600 Request for Data and Information, as outlined in the report:
  - *Generating Availability Data System: Mandatory Reporting of Conventional Generation Performance Data*

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Questions & Answers

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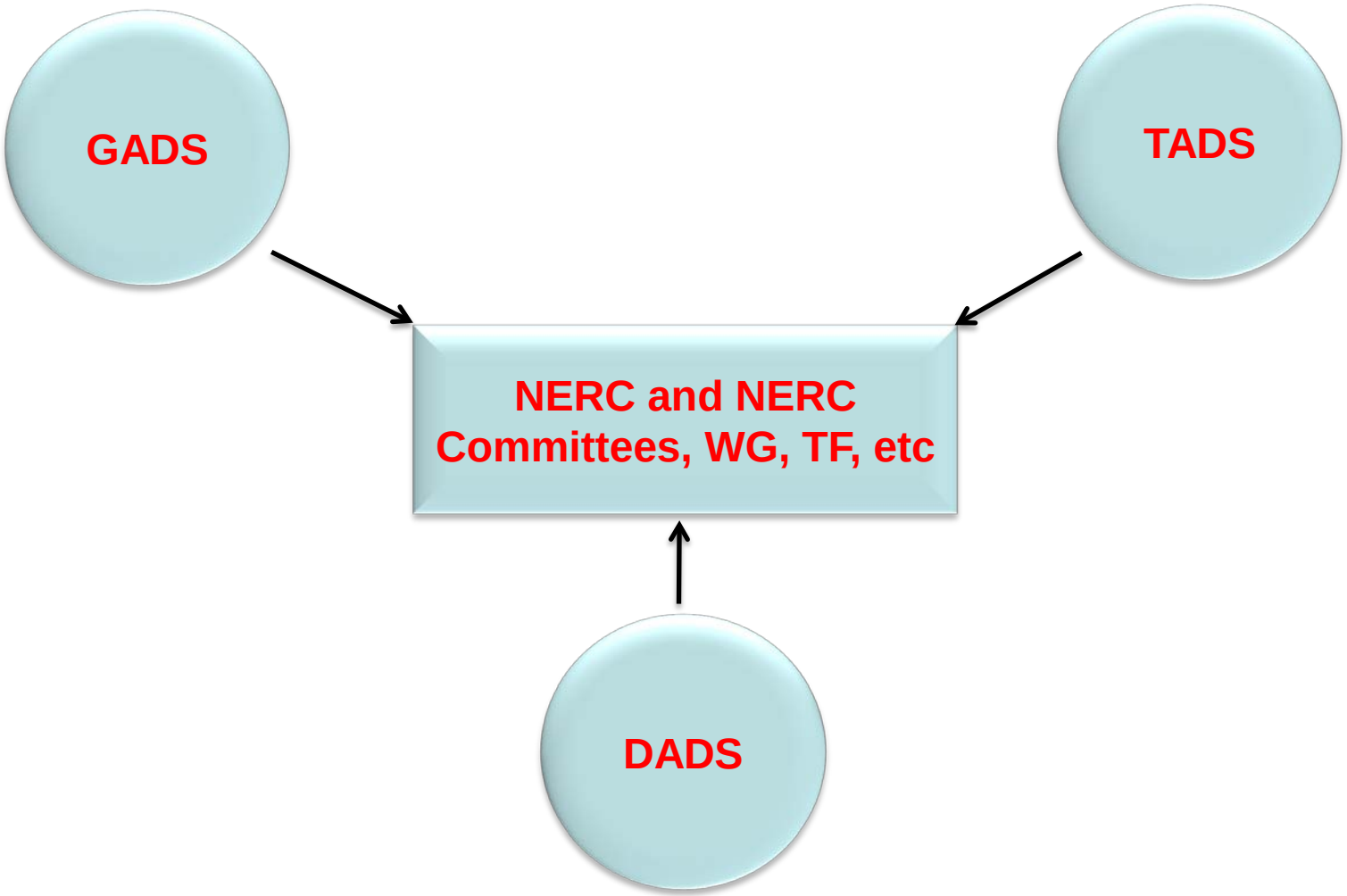
Background

to ensure the reliability of the bulk power system

Need For Data



TADS and DADS are already mandatory. GADS is the final step.

GADSTF Mandatory Justifications For Conventional Generating Units

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Table 2.1
Percent of Reporting Conventional Generating Units by Region
Units 20 MW or Larger

Region	2010 LTRA "Existing Certain" (Summer) Capacity (MW)	GADS Summer NDC (June - August) Reported Capacity (MW)	% GADS Capacity Reported
ERCOT	73,943	57,471	77.7%
FRCC	50,548	43,640	86.3%
MRO	53,815	44,672	83.0%
NPCC	152,104	54,477	35.8%
RFC	219,377	201,632	91.9%
SERC	245,147	185,309	75.6%
SPP	55,049	43,215	78.5%
WECC	203,953	133,529	65.5%
	1,053,936	**763,751**	**72.5%**

GADSTF Mandatory Justifications For Conventional Generating Units

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Table 2.2
GADS Data Reported by Region
Conventional Units 20 MW and Larger in the United States

Region	US 2010 LTRA "Existing Certain" (Summer) Capacity (MW)	US 2009 GADS Summer NDC (June - August) Reported Capacity (MW)	US Units % Capacity Reported To GADS
FRCC	50,548	43,640	86.3%
MRO (US)	45,158	44,672	98.9%
NPCC (US)	65,012	35,571	54.7%
RFC	210,489	201,632	95.8%
SERC	245,148	185,309	75.6%
SPP	54,081	43,215	79.9%
TRE	85,581	57,471	67.2%
WECC (US)	179,001	123,814	69.2%
	935,018	**735,324**	**78.6%**

GADSTF Mandatory Justifications For Conventional Generating Units

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Table 2.3
Percent of Reported GADS Data by Region
Conventional Units 20 MW and Larger in Canada

Region	Canada 2010 LTRA "Existing Certain" (Summer) Capacity (MW)	Canada 2009 GADS Summer NDC (June - August) Reported Capacity (MW)	Canada Units % Capacity Reported To GADS
MRO (Canada)	8,657	0	0.0%
NPCC (Canada)	87,035	18,906	21.7%
WECC (Canada)	24,922	9,715	39.0%
	120,614	**28,621**	**23.7%**

GADSTF Mandatory Justifications For Conventional Generating Units

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Table 2.4
Percent of Missing GADS Data by Unit Types
Conventional Units 20 MW and Larger In North America

Types of Generating Units	Percent of Missing Capacity in GADS Compared to Long-Term Assessment Data
Combined cycle generation	42.9%
Gas turbine - simple cycle	31.3%
Hydro-Pumped storage	54.7%
Fossil	14.3%
Nuclear	13.6%

GADSTF Mandatory Justifications For Conventional Generating Units

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Table 2.5
Percent of Missing New Generating Units Not Reporting to GADS
Conventional Units 20 MW and Larger in the United States

Number of New , Commercial - operating Generating Units in GADS (2000-2008)	Total NDC MW Capacity from New Commercial Units in GADS (2000-2008)	Number of New, Commercial-operating Generating Units in EIA Form 860 (2000-2008)	Total MW Capacity from New Commercial Units in EIA Form 860 (2000-2008)	Percent of New, Commercial-operating Unit MW Capacity Missing in GADS
1,059	151,437	4,531	296,200	**48.9%**

Recommendations – Section 1600 & 1500

- The task force recommends that GADS data be provided from all NERC Compliance Registry Generator Owners, following Section 1600, *Requests for Data or Information* under NERC's *Rules of Procedures*.
- GADS data confidentiality will be covered under NERC's *Rules of Procedure* Section 1500, *Confidential Information.*

Recommendations – Ten Types of Units

- Fossil steam including fluidized bed design;
- Nuclear;
- Gas turbines/jet engines (simple cycle and others modes);
- Internal combustion engines (diesel engines);
- Hydro units/pumped storage;
- Combined cycle blocks and their related components
- Cogeneration blocks and their related components
- Multi-boiler/multi-turbine units;
- Geothermal units; and
- Other miscellaneous conventional generating units used to generate electric power for the grid as defined by the GADS Data Reporting Instructions.

Recommendations – MW Reporting Phased in

- Generator Owners shall report their GADS data to NERC as outlined in the GADS Data Reporting Instructions (Appendix III) for design, event and performance data for generating units
  - 50 MW and larger starting January 1, 2012
  - 20 MW and larger starting January 1, 2013
- Generator Owners not listed on NERC's Compliance Registry may report to GADS on a voluntary basis.

Recommendations – One-time Conversion

- There will be a one-time effort by non-reporting generating companies to modify their existing computer data collection program outputs into GADS required formats. The GADSTF believes that equipment outage data is already collected by plant personnel, although they may not adhere to GADS requirements.

Recommendations – Uniformity in Data

- Uniformity of data collection format is essential. All GADS data shall be collected using the GADS Data Reporting Instructions. The Reporting Instructions will be updated annually and each reporting company will be required to follow the latest Reporting Instructions for the current year. All questions or needs for interpretation of the reporting instruction interpretations will be coordinated with NERC staff and the GADSTF.
- Updates will follow the Section 1600 process.

Recommendations – Self Auditing

- In-house review of GADS data by the reporting generating company has always been strongly encouraged under voluntary data reporting. Each reporting generating company shall continue to be responsible for collecting, monitoring, updating and correcting their own GADS design, event, and performance data.

Recommendations – Design Data

- Up-to-date design data is essential for many generating plant analyses. Generating companies shall review and update their design data periodically or as recommended by NERC staff using the design time-stamping process.
- Nine design fields required at this time.

Recommendations – Unit Ownership, No Unit Retirement Dates

- NERC shall track ownership changes as generating units are sold to other operating companies. These changes will include the name of the new owners and the date of generating unit transfer.

  (Please note that GADS has been collecting ownership transfers for 10 years with no burden on reporters.)

- Proposed or projected generating units retirement dates shall not be collected in GADS

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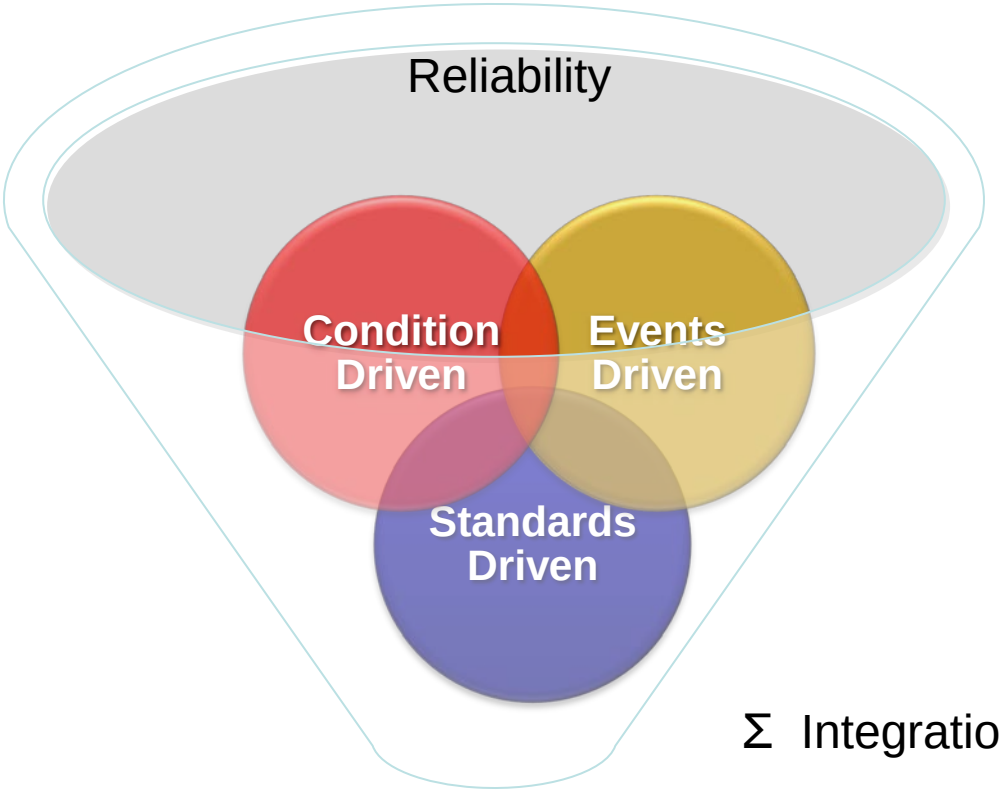
2011 Risk Assessment of Reliability Performance

Mark Lauby, Vice President and Director,
Reliability Assessments and Performance Analysis

August 4, 2011

to ensure the reliability of the bulk power system

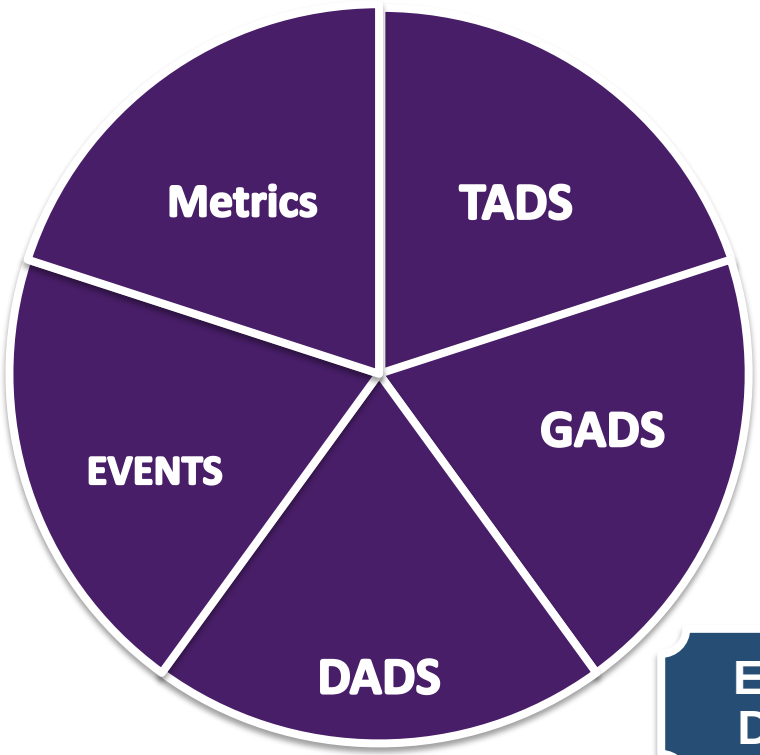
Integrated Reliability Measures to State of Reliability



Σ Integration and Analysis

State of Reliability Report

Data Source Integration and Analysis



Integration and Analysis

Events Driven

Condition Driven

Standards Driven

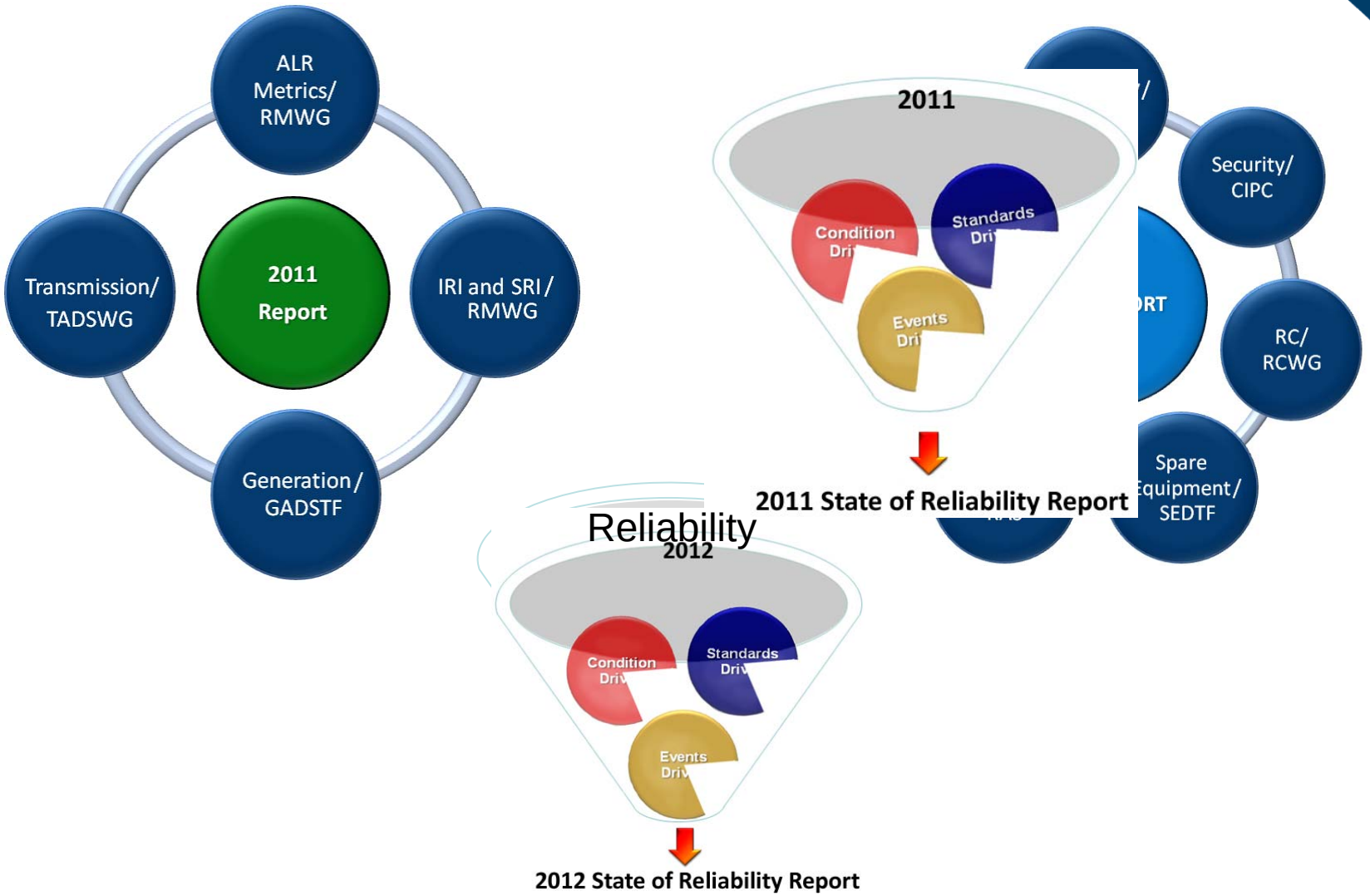
Critical Infrastructure Protection

Standards Dev & Prioritization

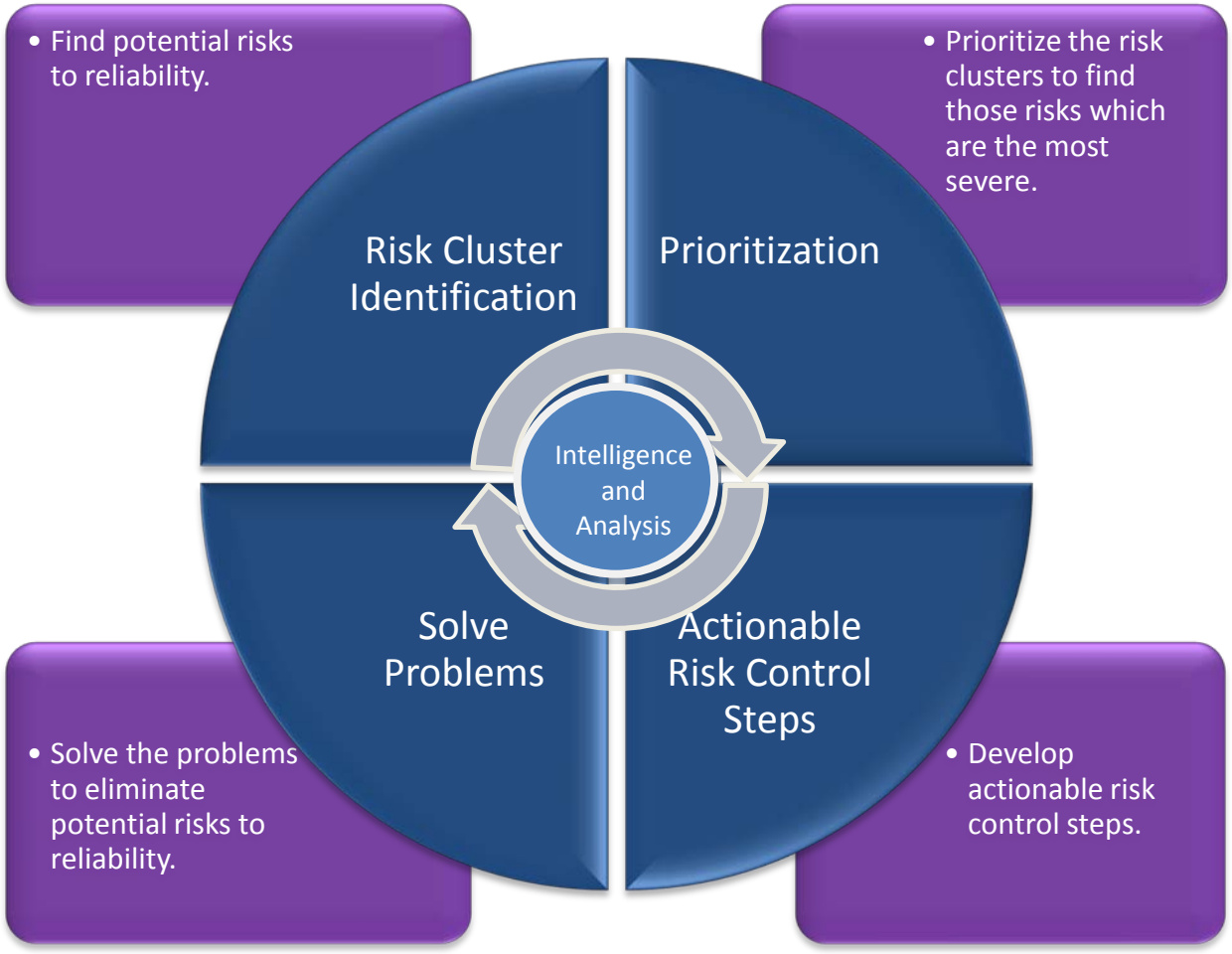
Compliance

Events Analysis

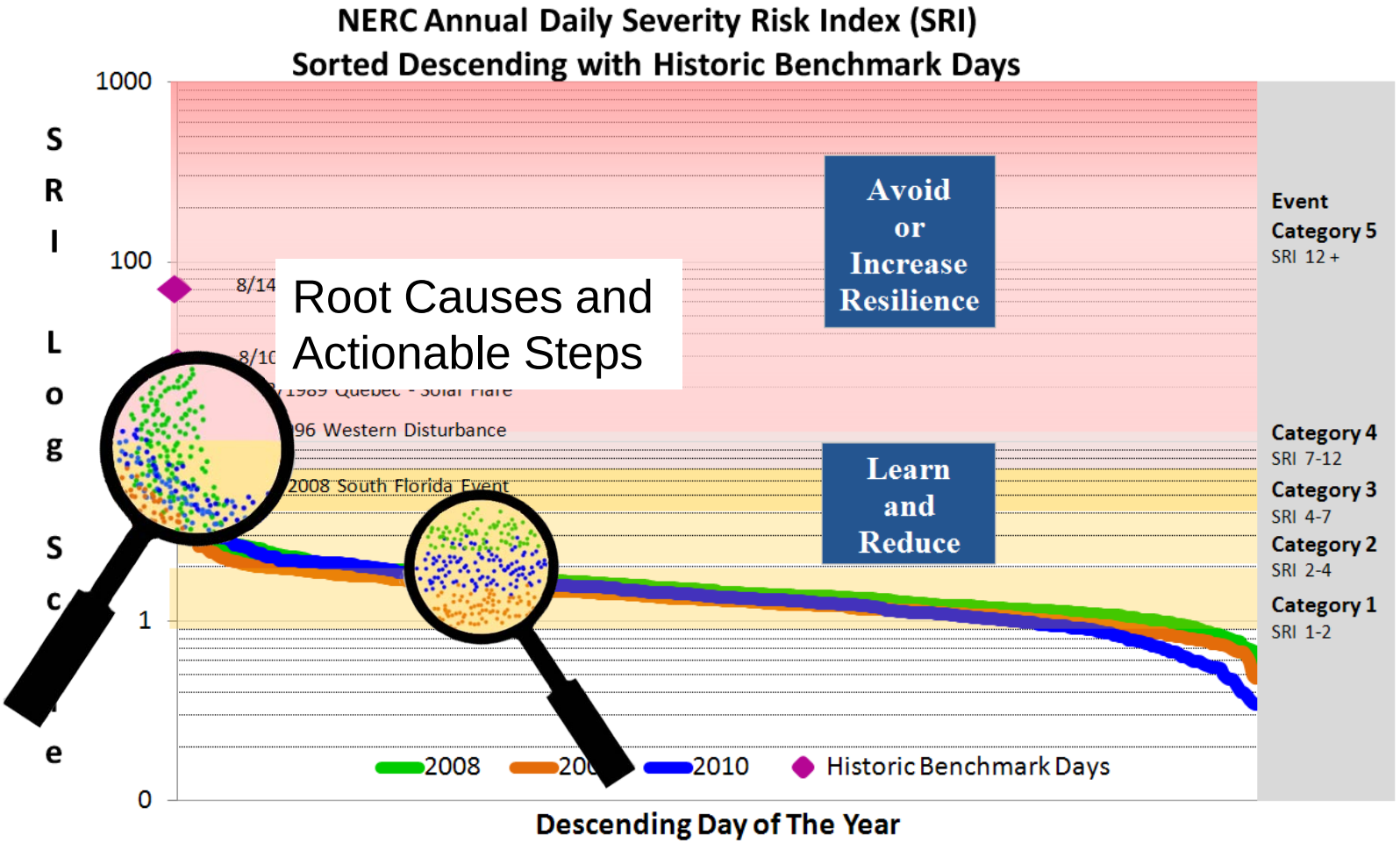
Integrated Reliability Concepts to State of Reliability



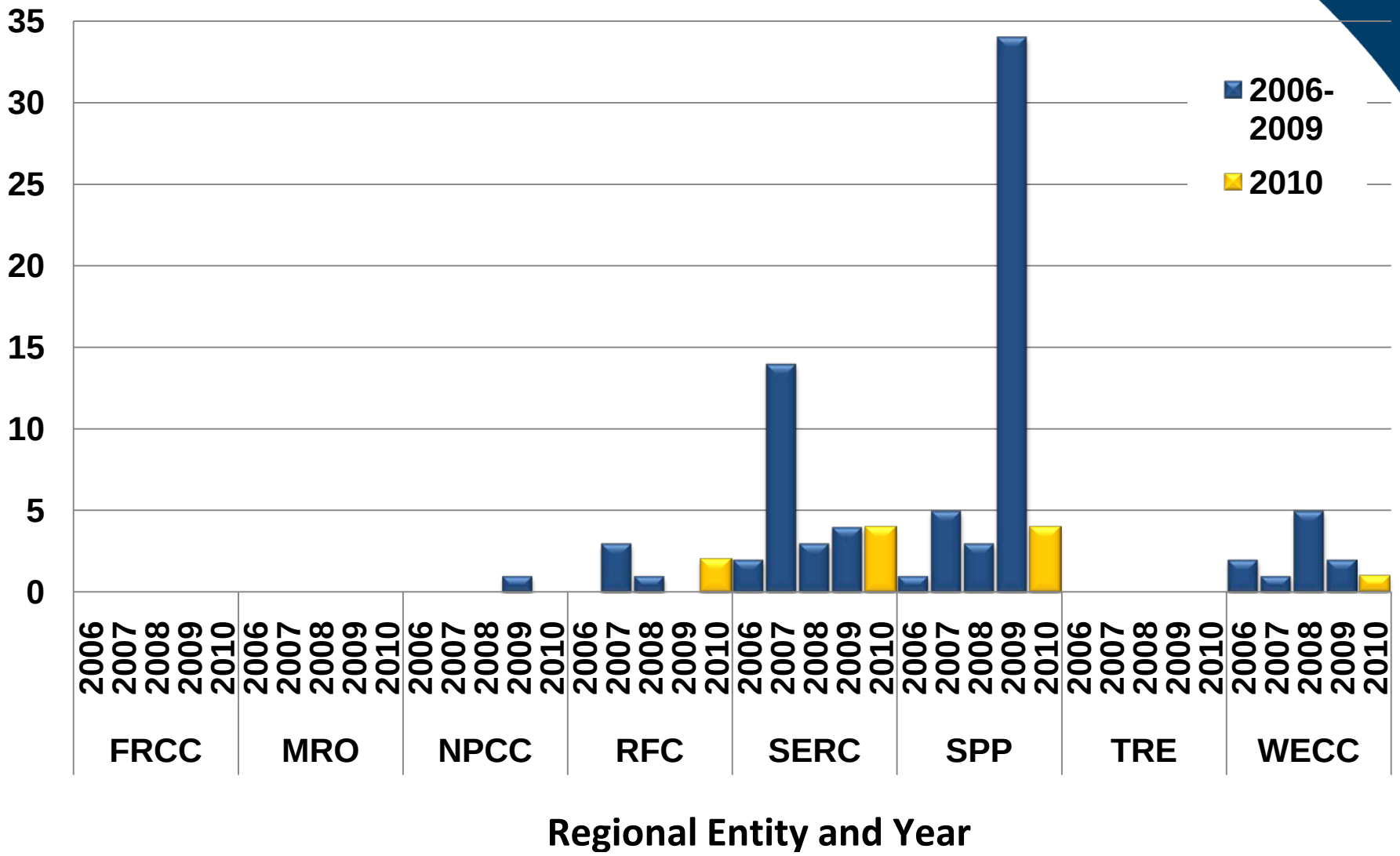
The Risk Control Reduction Cycle



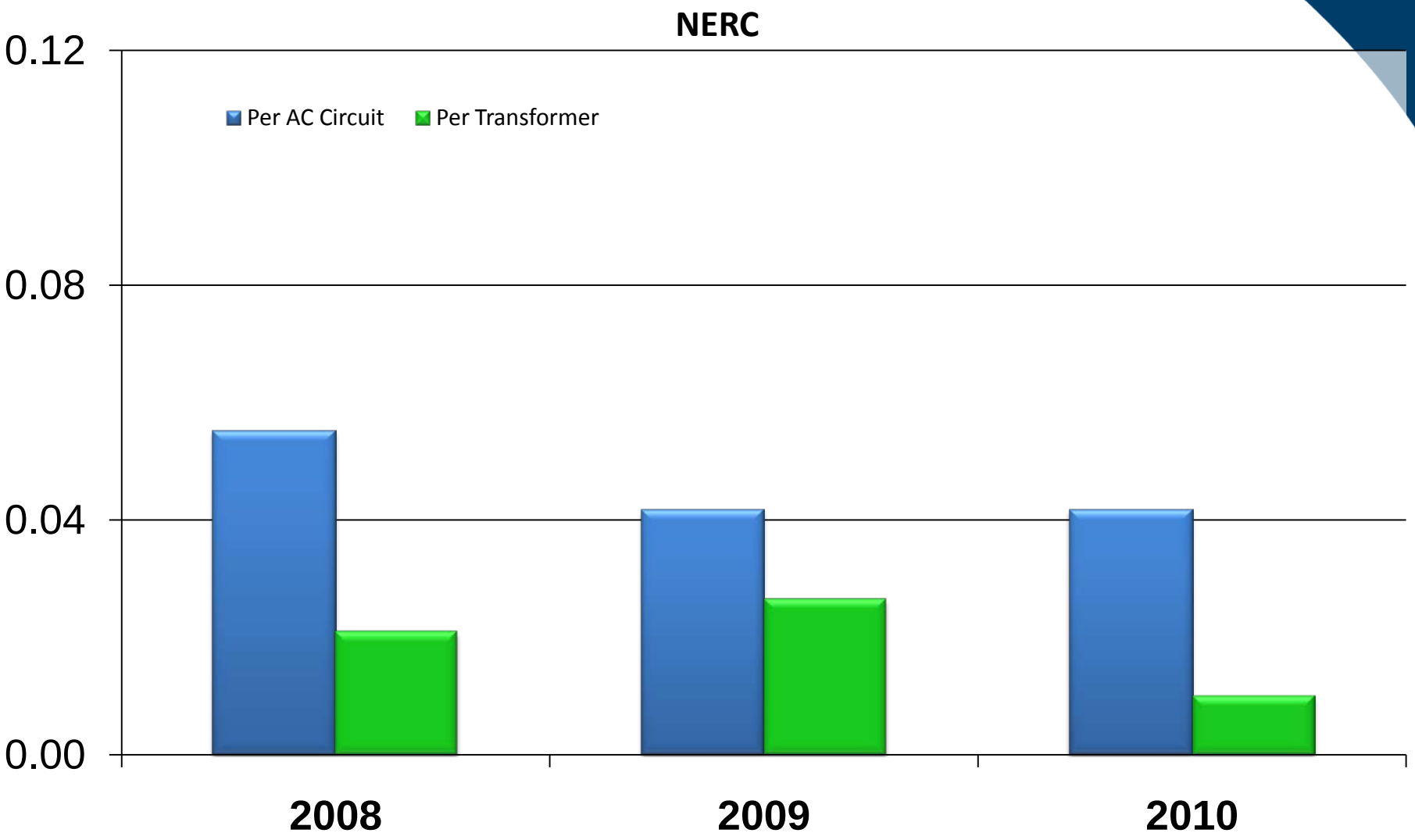
Severity Risk Index and Risk Cluster



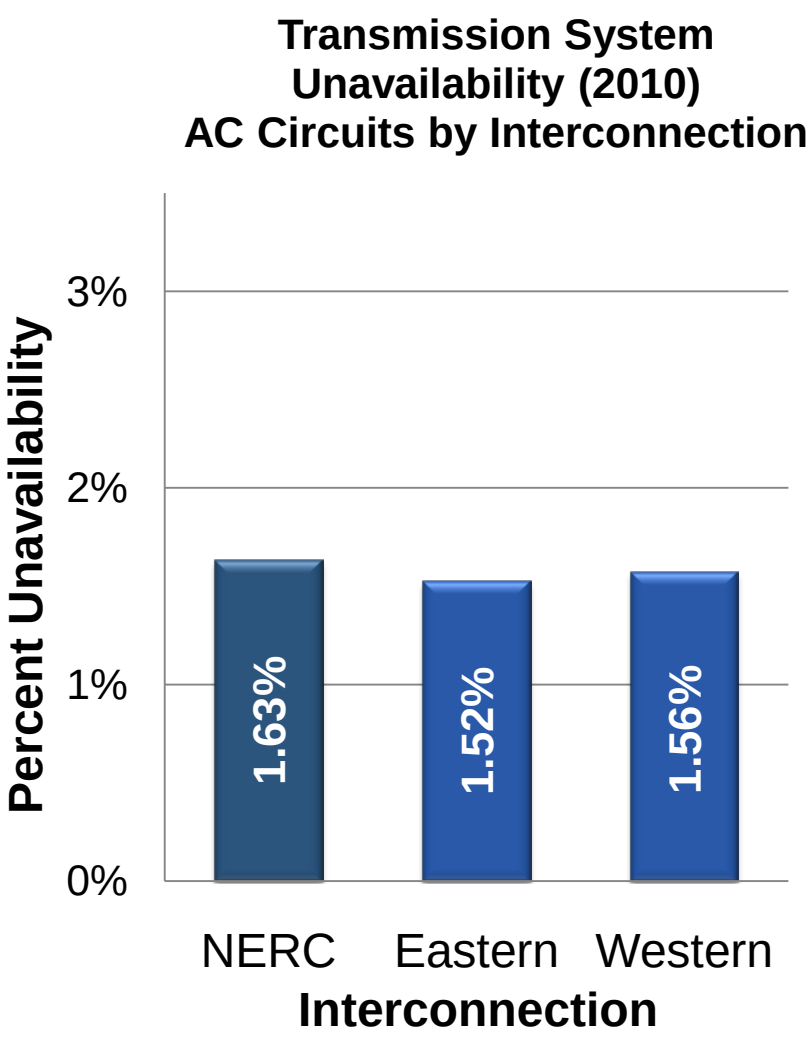
ALR6-2 Trends
Energy Emergency Alert 3 (EEA3)

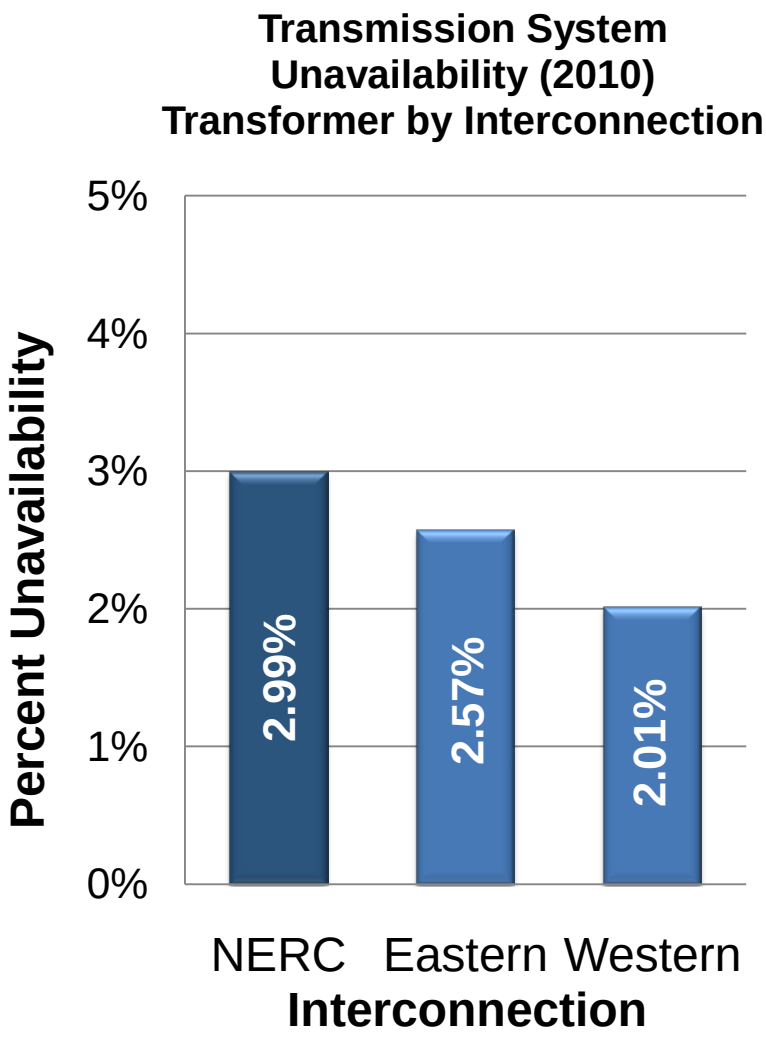


ALR6-11 Automatic Outages Initiated by Failed Protection System Equipment



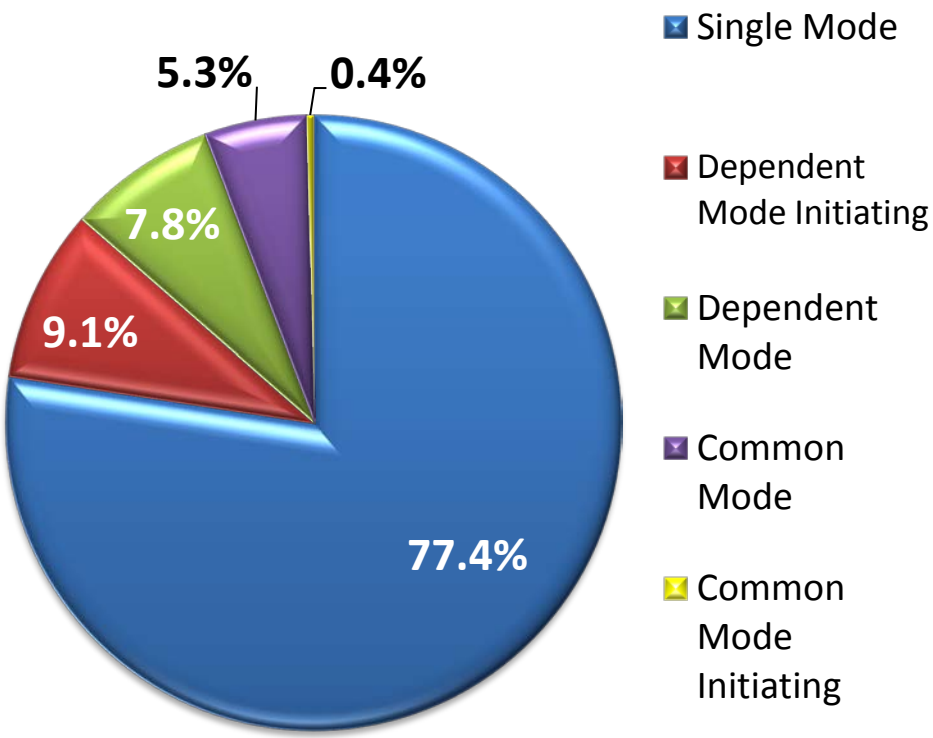
ALR6-16 Transmission System Unavailability



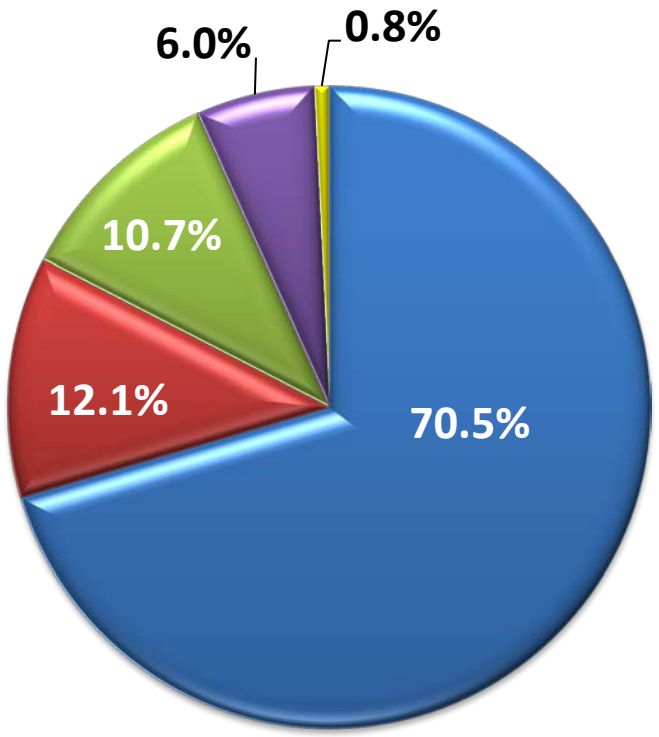


Sustained and Momentary Automatic Outage Mode Code (2008-2010)

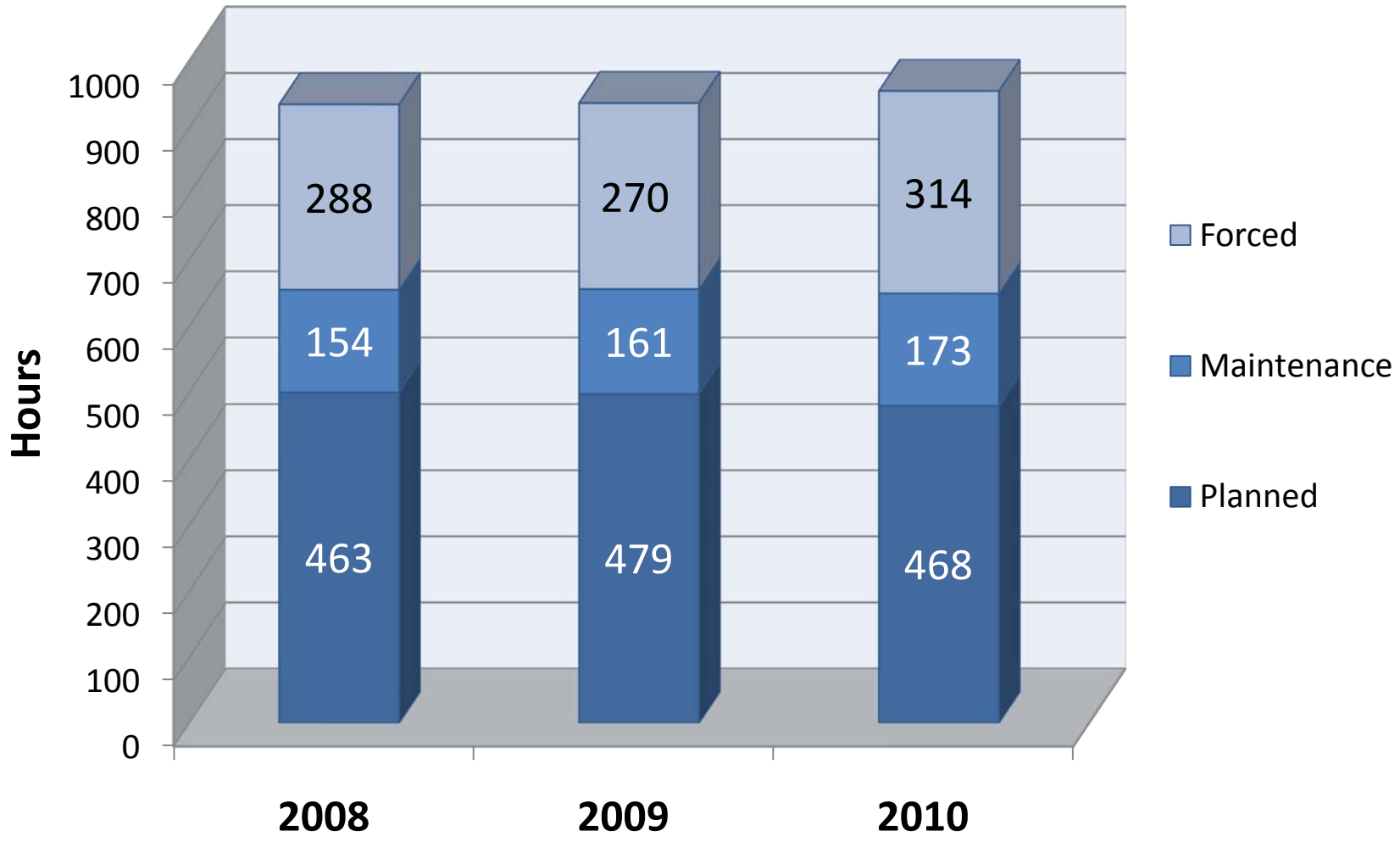
AC Circuit Momentary Automatic Outage Mode Code (2008-2010)



AC Circuit Sustained Automatic Outage Mode Code (2008-2010)



Average Outage Hours for Units > 20 MW



Questions and Answers