


# WECC and NERC Protection Criteria and Standards

## iPC GRID

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# WECC PRC Standard

## **PRC-004-WECC-1 Protection System and Remedial Action Scheme Misoperation**


- More rigorous than related NERC standards
  - 40 specific “Major Paths” and 27 “Major RAS” to which the standard applies
  - Redundancy and Functionally Equivalent Protection Systems (FEPS)
  - Specific response times following suspect events or misoperations
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# WECC PRC Criteria

## PRC-(012-014)-WECC-CRT-1, -2 Remedial Action Scheme Review and Assessment Plan

- WECC Criteria implements requirements for NERC fill-in-the-blank, “FIB” standards
  - RAS technical requirements
  - RAS review process
  - RAS database
  - RAS periodic assessments
  - Classifications of RAS
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# WECC RAS Types

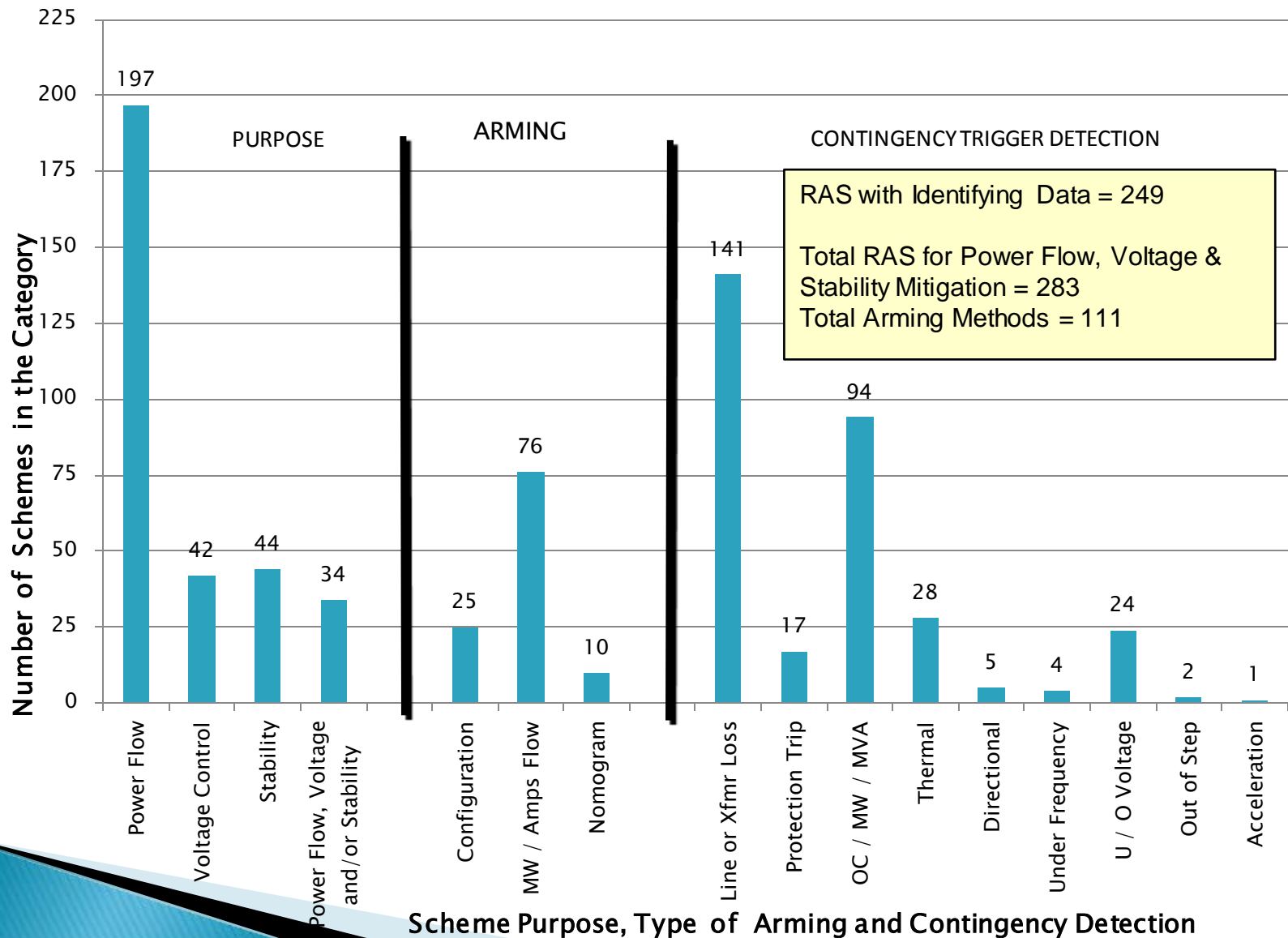
- Wide Area Protection Scheme (WAPS)
  - Local Area Protection Scheme (LAPS)
  - Safety Net (SN)
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# WECC RAS Database

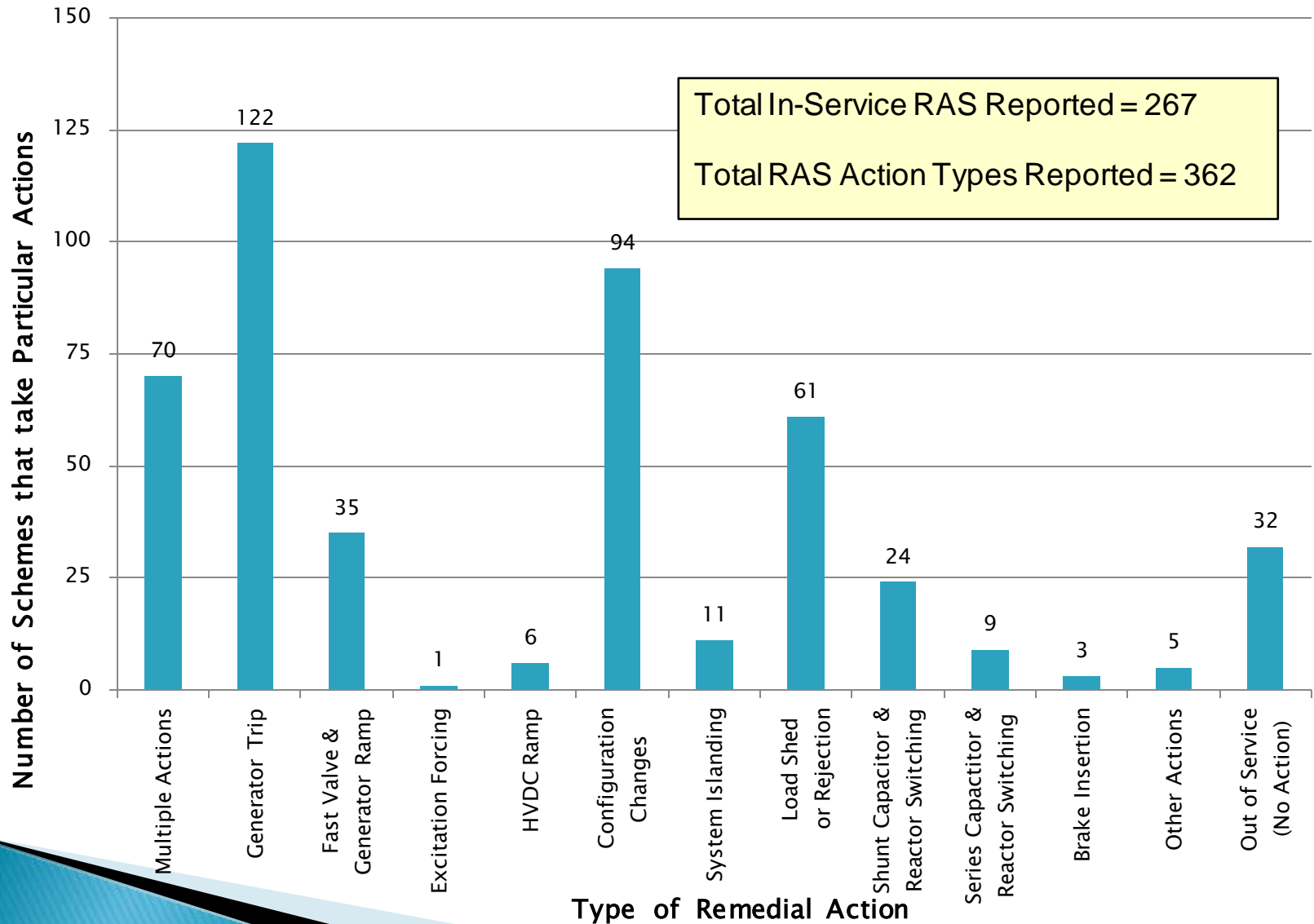
Western Interconnection has over 40% of the SPS/RAS that have been reported to NERC by all Regional Entities

- WAPS – 63
- LAPS – 187
- SN – 17
- Total WECC RAS – 267

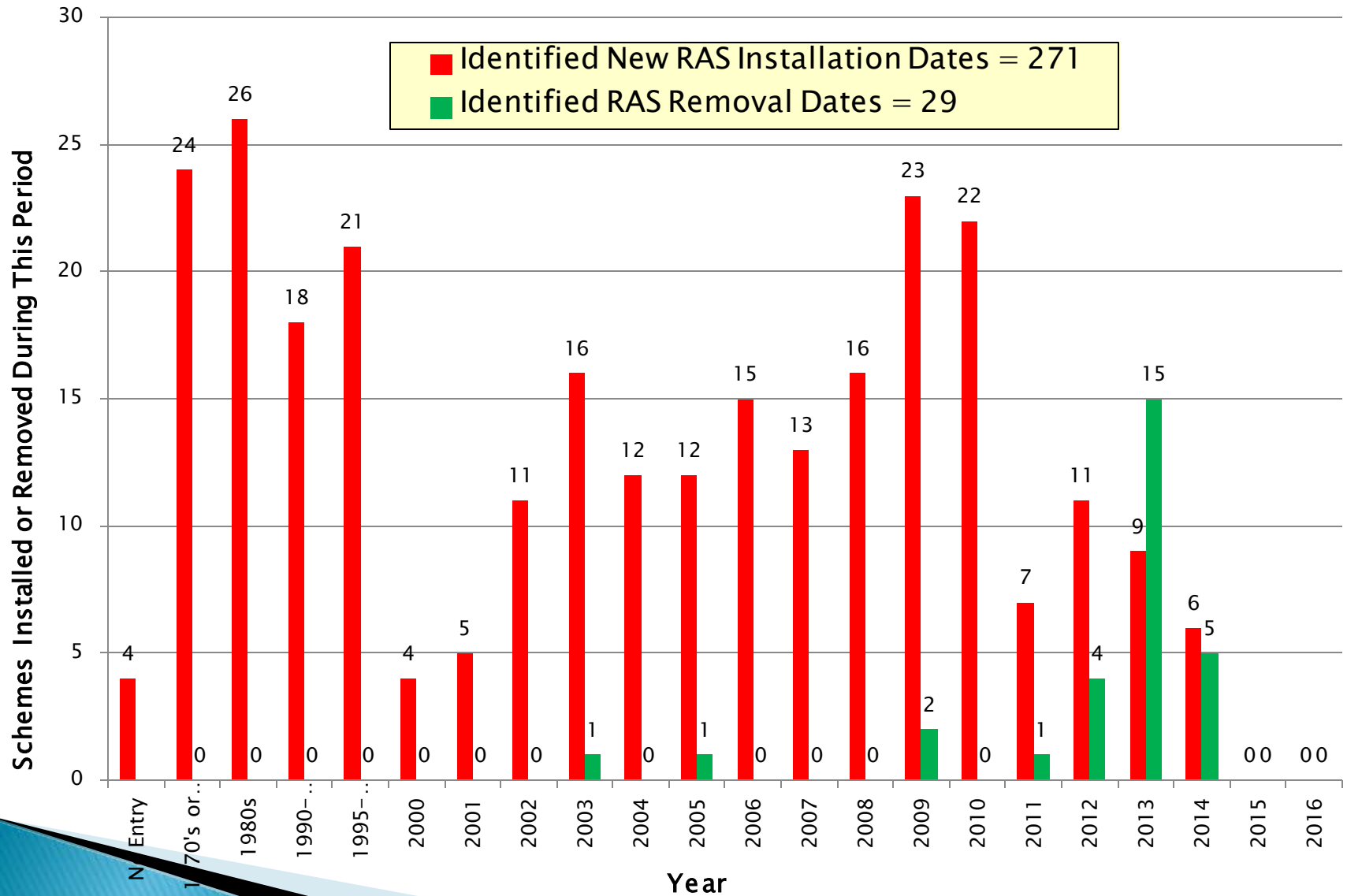
# WI RAS Purpose, Arming, and Triggers



# WI RAS Actions



# WI RAS Installations and Removals






# NERC PRC Standards

Address all reliability aspects of Bulk Electric System (BES) protection systems. Several recent and in-progress standards:

- ▶ Coordination between entities
- ▶ Maintenance
- ▶ Event data collection and analysis
- ▶ Misoperations
- ▶ Loadability
- ▶ UFLS
- ▶ **UVLS**
- ▶ **SPS/RAS**


# Under Voltage Load Shedding

**Consolidate and revise four existing standards . . .**

- **Assessment of the design and effectiveness of UVLS**
  - **UVLS database**
  - **UVLS Program data**
  - **UVLS performance**
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# Under Voltage Load Shedding

## **. . . with objects including**

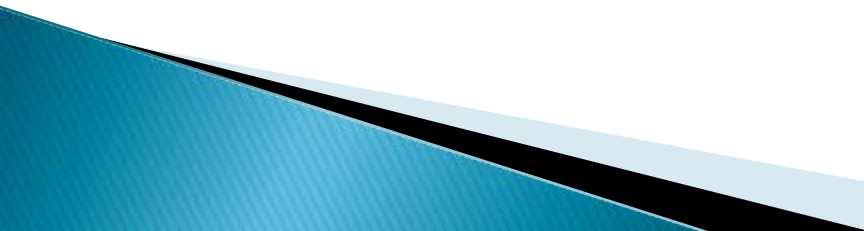
- Address FERC orders
  - Remove Regions from applicability
  - Consolidate the standards
  - Centrally-controlled UV schemes not to be included
  - Results-based standard that addresses current reliability issues
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# Under Voltage Load Shedding

## New UVLS definition proposed

**Undervoltage Load Shedding Program (UVLS Program):** An automatic load shedding program consisting of distributed relays and controls used to mitigate the risk of Cascading, voltage instability, voltage collapse, or uncontrolled separation resulting from undervoltage conditions. **Centrally-controlled undervoltage-based load shedding is not included.**

# System Integrity Protection Schemes (SIPS)

- ▶ The IEEE PSRC indicates that SIPS encompasses Special Protection Systems (SPS), Remedial Action Schemes (RAS), as well as additional schemes such as, but not limited to, under frequency (UF), under voltage (UV), out-of-step (OOS) relaying, etc.
  - ▶ 2009 PSRC survey listed 25 specific mitigation methods to aid in consistently classifying responses to the survey
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# Special Protection Systems (SPS)

The NERC definition of SPS has similarities to the IEEE SIPS,

An automatic protection system designed to detect abnormal or predetermined system conditions, and take corrective actions other than and/or in addition to the isolation of faulted components to maintain system reliability . . . . Also known as Remedial Action Scheme (RAS).

However . . .




# Special Protection Systems (SPS)

The NERC definition of SPS is different from SIPS primarily in that it excludes certain types of schemes

- Under frequency or under voltage load shedding
- fault conditions that must be isolated
- out-of-step relaying protection

# NERC Regions SPS Variety

All eight NERC Regions use different review procedures and varying definitions of SPS and SPS misoperations.





# NERC SPS Standards

Existing PRC-012, PRC-013, and PRC-014

- FERC concluded that they are not legally enforceable (fill in the blank, FIB, standards)
- NERC will eventually re-write all FIB standards
- Assign responsibility to Regions to identify how SPS/RAS are reviewed and tracked

SDT to write SPS standards just formed

- SAR comment period closed March 19

# NERC SPS Drafting Team

First official business is to propose a new SPS definition

- Based on 2013 NERC white paper proposal
- Normal NERC standards development process to be followed
- White paper definition posted, closes April 9  
[http://www.nerc.com/pa/Stand/Pages/Project-2010-05\\_2%E2%80%93Special-Protection-Systems.aspx](http://www.nerc.com/pa/Stand/Pages/Project-2010-05_2%E2%80%93Special-Protection-Systems.aspx)
- Coordinated, posted, reviewed and balloted in conjunction with the UVLS proposed definition
- Estimated BOT approval November 2014


# Proposed SPS Types

Four scheme classifications: Planning or Extreme events having Significant or Limited BES impact (PS, PL, ES, EL)


- Planning or Extreme events from TPL standards for system performance for various types of contingencies
- Significant or Limited impact based on
  - 300 MW non-consequential load loss
  - Generation at risk (rating of largest unit within interconnection)
  - Loss of synchronism with more than a single plant
  - Negatively damped oscillations

# New SPS Standards

NERC primary objectives include:

- Address PRC-012 – PRC-017
  - Define SPS misoperations and reporting responsibilities
  - Describe SPS review and approval process
  - Identify data included in the SPS database
  - Identify periodic assessment requirements
  - Assign each Entity's responsibilities
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# New SPS Standards

- ▶ Top Priority = Early consensus-building
  - ▶ Follow the effort, attend outreach events, and provide constructive feedback
  - ▶ Please contact Erika Chanzas at [Erika.Chanzas@nerc.net](mailto:Erika.Chanzas@nerc.net) with any questions and to be added to the project's email distribution list
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Questions?

