

Equipment Placement Task Team

The Importance of Being Metered

NASPI Working Group Meeting

Long Beach, CA

Robert W. Cummings
NERC Director of Event Analysis
& Information Exchange

May 9, 2007



NERC Proposed Location Criteria

In Eastern Interconnection

- Flowgates – TLR 5s over last 2 years

In Western Interconnection

- Rated Paths
- Generating Stations $\geq 1,500$ MW
- Major Transmission Interfaces
 - Regional/interregional studies
- Angular separation observability
 - Covers inter-area oscillations
- Correlation to regional DME locations
- Major load centers

EPTT – Next Steps

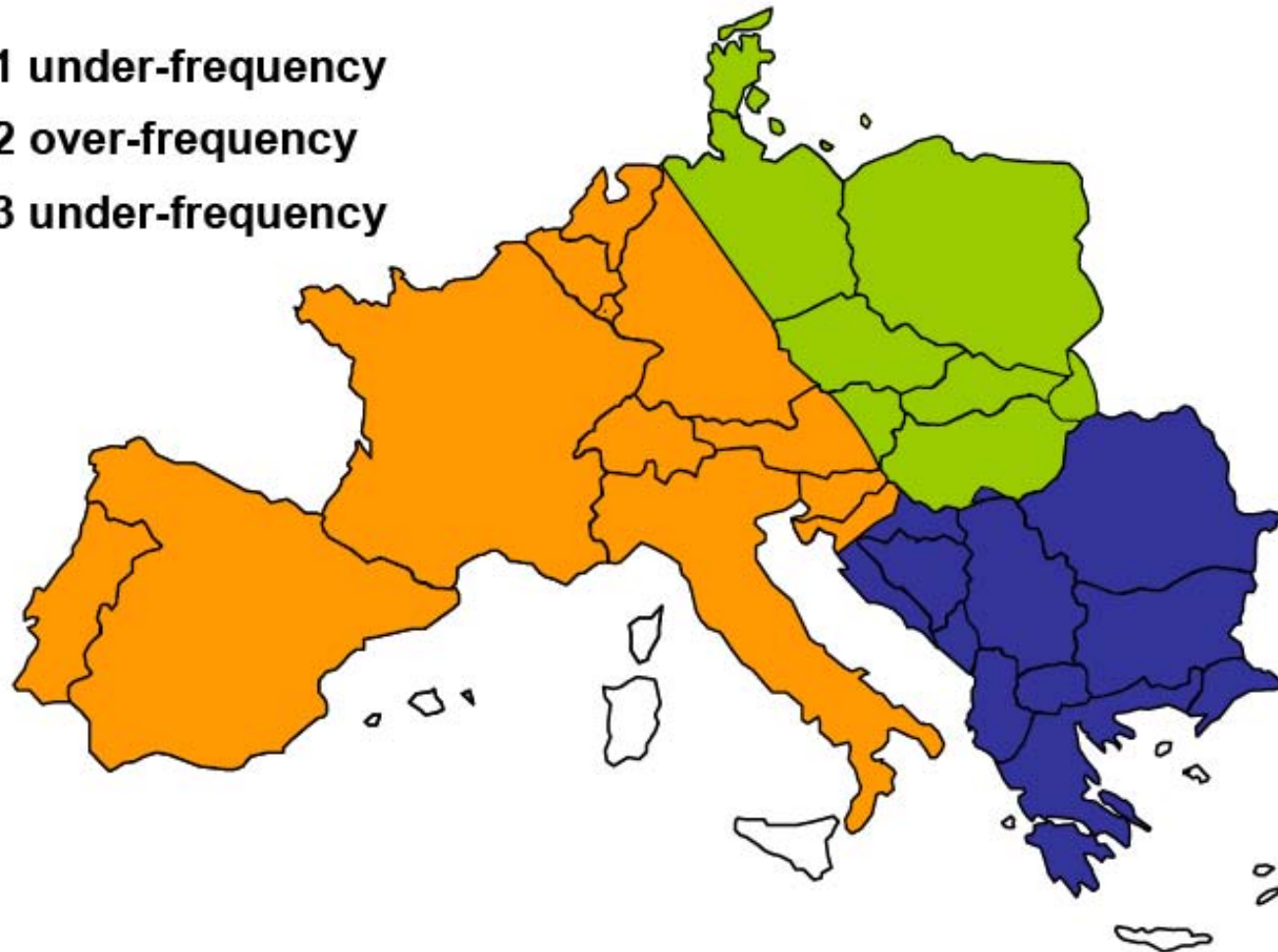
- Refine NERC proposed location list
 - Review for application coverage
- Work with WECC
 - WAMS Task Force
 - Disturbance Monitoring Working Group (DMWG)
 - Model Validation Working Group (MVWG)
- Differentiate between PMU capable relays and true PMUs
- Catalogue data at each location
- Help define scope with ERCOT

Equipment Cataloguing Needs

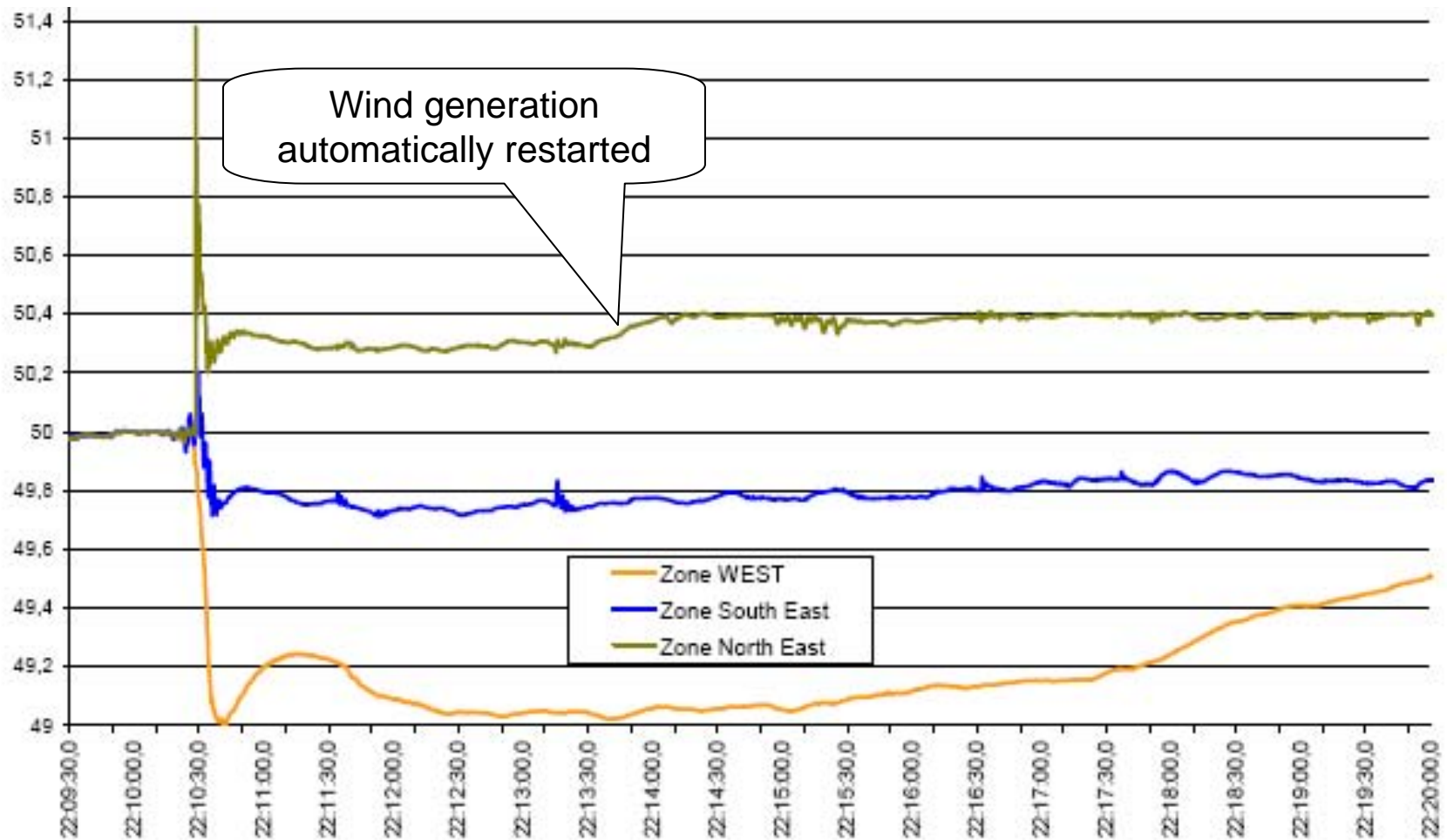
- Location
- Manufacturer
 - Model
- Protocol (37.118, OPC, etc.)
- Required offsets (if applicable)
- Data Channels (for each)
 - Data Description
 - Data type/label (V, Amp, MW, etc.)
 - Sample rate (A/D converter info?)
 - Phase (which phase is the voltage or current)
 - PT Type (quality)
 - CT Type
 - Applications using this data
 - Other (recipients?)

European Islanding

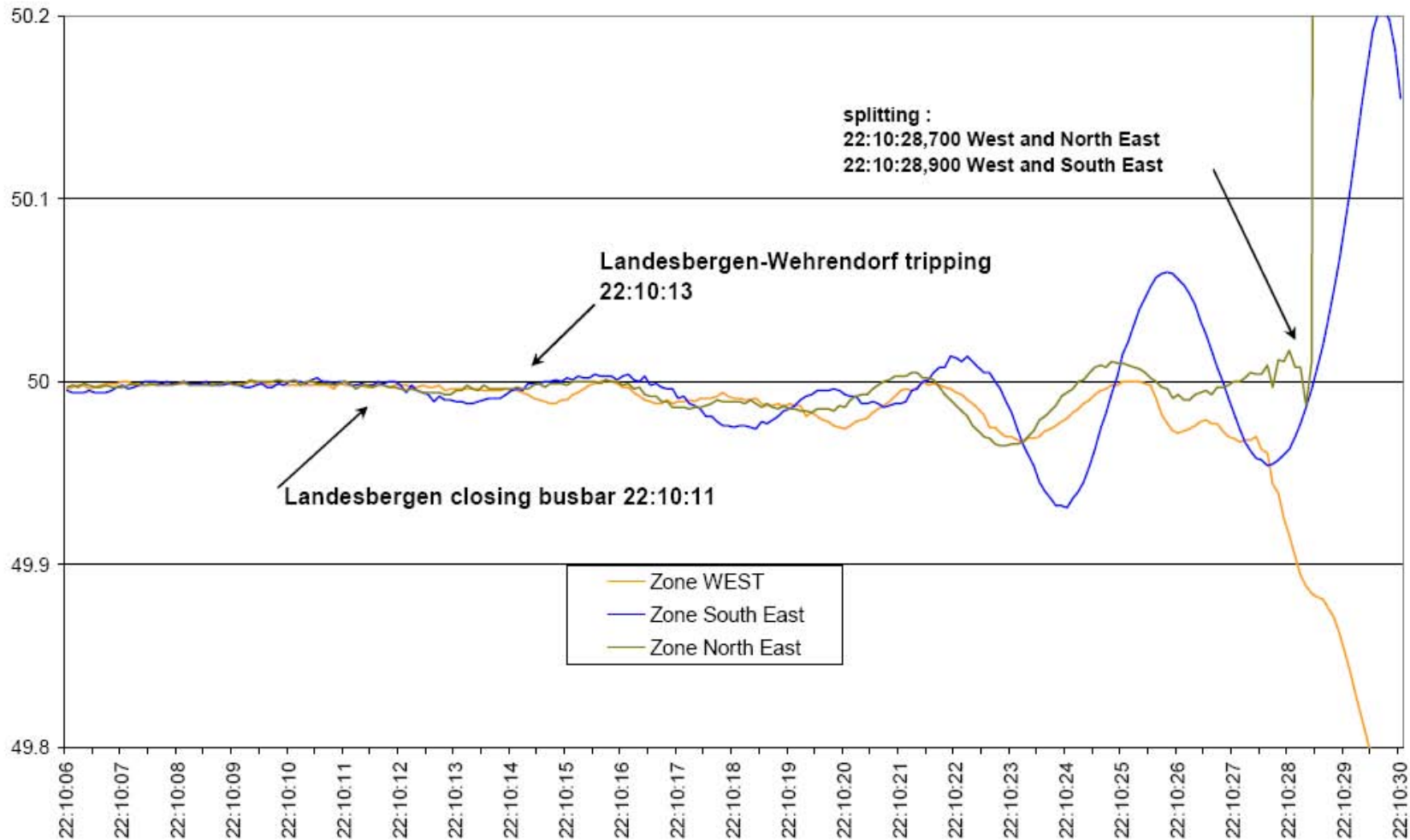
- Area 1 under-frequency
- Area 2 over-frequency
- Area 3 under-frequency



European Island Frequency Profiles



European Oscillations





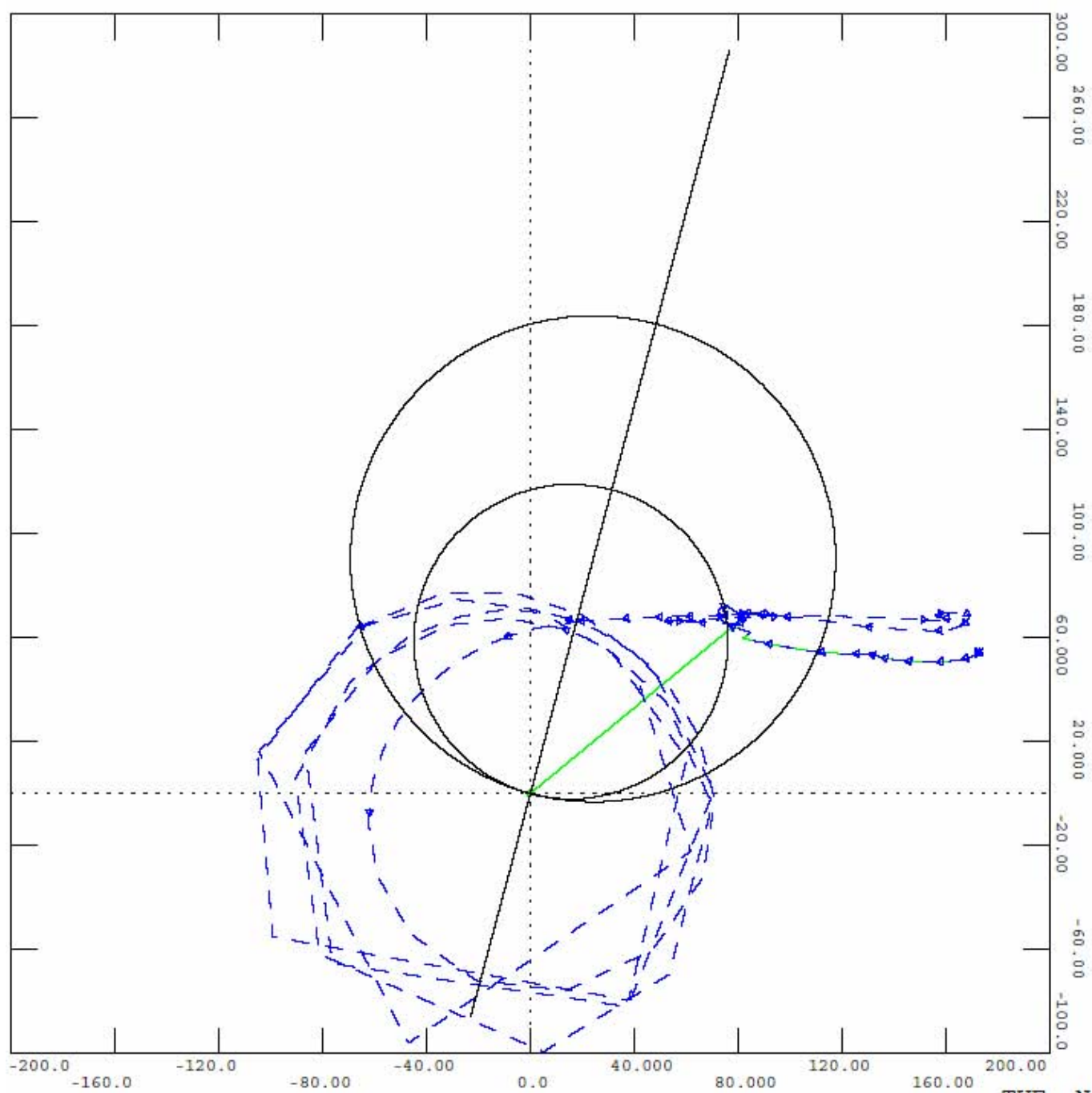
2003 SUMMER MEN/VIEW CASE
AUGUST 14, 2003, 16:05.55.530 HOUR, RECORD 253

FILE: 161045-48T11_7d_hc.198s.out - - *
FILE: 161045-48T11_7d.198s.out * - - *

RELAY: DISTR1

TSTART: 186.0 TSTOP: 196.5 TIC INCREMENT: 0
CHNL# 3887: [X-WATERCURE-HOMER CTY 345] *1190

Trip Blocked
Actual
Tripping Time

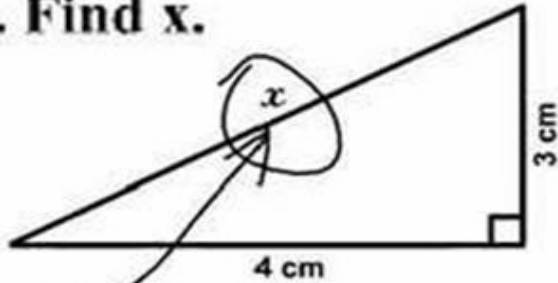


CHNL# 3886: [R-HOMER CTY-WATERCURE 345] *1190.25

TUE, NOV 08 2005 18:04
HOMER CITY-WATERCURE R-X

Questions?

3. Find x .



Here it is

After explaining to a student through various lessons and examples that:

$$\lim_{x \rightarrow 8} \frac{1}{x-8} = \infty$$

I tried to check if she really understood that, so I gave her a different example.

This was the result:

$$\lim_{x \rightarrow 5} \frac{1}{x-5} = \infty$$

$$\frac{1}{n} \sin x = ?$$

$$\frac{1}{n} \cancel{\sin} x =$$

$$\text{six} = 6$$