

NWPP

***After-the-Fact
and
System Schedulers
Meetings***

**October 15-16, 2013 –
Portland, OR**



Next Meeting...

October 21-22, 2014
– Portland, OR

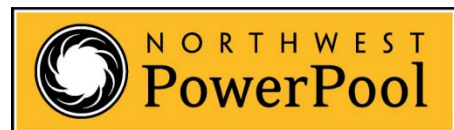
If you are interested in participating
on the Agenda Committee

please contact:

charee@nwpp.org

or

(503) 445-1079





AFTER-THE-FACT AND SYSTEM SCHEDULERS MEETING
October 15-16, 2013
DoubleTree by Hilton – Portland
1000 NE Multnomah Portland, OR 97232

Agenda

Oct. 15, 2013 – 1:00 p.m. to 5:00p.m.
Welcome and Arrangements

ChaRee DiFabio, NWPP

1. **WECC ISAS – Status Update**
 - WIT Checkout document
 - WIAB Training and Test Plan

Andy Meyers, BPA

Introductions
Break

2. **FERC Order 764**
 - PacifiCorp Changes
3. **Status Update - WEQ-EIR** (replacement of WIT Registry)
4. **NWPP Corporate Update**

Kathy Anderson, IPC
Kathee Downey, PAC

Bob Harshbarger, PSE

Jerry Rust, NWPP

Evening Reception 5:00 to 8:00

Oct. 16, 2013 – 8:00 a.m. to 12:00 p.m.
Welcome Back

ChaRee DiFabio, NWPP

1. **Solar Magnetic Events**
2. **What is an ATF Tag?**
 - How shall it be used?
 - ATF Guidelines Update
3. **BPA’s alternate scheduling center**

Richard Becker, BPA

Amy Lubick, NWMT

Lou Miranda, BPA

Break

4. **WECC Bifurcation – Status Update**
5. **Enhanced Curtailment Calculator – replacing WEBSAS**
6. **PAC/ISO EIM – Status Update**
7. **Burning Issues**
 - NWPP Settlement Price
 - USF
 - Curtailments (seasonal issues – What worked. What didn’t?)

Craig Williams, WECC

Craig Williams, WECC

John Apperson, PAC

All

Closing & Door Prizes



*Presenter Biographies –
After-the-Fact Meetings & System Schedulers
October 15-16, 2013 – Portland, OR*

WECC ISAS – Status Update & WIAB Training and Test Plan

Andy Meyers is the WECC ISAS Vice Chair and is the Supervisor Preschedule at Bonneville Power Administration – Power.

FERC Order 764 Task Force

Kathy Anderson is the Transmission Operations Leader at Idaho Power Company overseeing Open Access Transmission Tariff Administration, Pre-schedule, and ATF Interchange Operations. She joined Idaho Power in 2005 and has been in her current position since 2009. A graduate of Boise State University, Kathy is NERC certified and serves on the WECC Market Interface Committee and the Interchange Scheduling and Accounting Subcommittee (ISAS).. Kathy was the chair of WECC's Order 764 Task force which reviewed the impacts of 15-minute scheduling for the WECC footprint.

FERC Order 764 Task Force – PacifiCorp Changes

Kathee Downey joined PacifiCorp in 1989 and has worked in various departments including wholesale sales, regulatory, back office and system operations. Currently, she is the Manager of Balance and Interchange in grid operations. Kathee has been actively involved in various WECC, Joint Initiative, and Northwest Power Pool efforts. Along with many others, she was a participant on the WECC Joint Guidance Committee task force addressing 15-minute scheduling.

Kathee is a graduate of San Diego State University and holds a Bachelor of Science in Criminal Justice and is NERC certified - Balance and Interchange. As of this writing, Kathee has 729 working days left to retirement.

WEQ-EIR – Status Update

Bob Harshbarger is currently the OASIS Trading Manager at PSE. He has been at times involved with various NERC, NAESB, WECC, wesTTrans OASIS, Joint Initiative, and ColumbiaGrid activities.

- Member of the NERC Coordinate Interchange Standards Drafting Team
- Member of the NERC Interchange Subcommittee
- Co-Chair of the NERC/NAESB Joint Electric Scheduling Subcommittee.
- Member of the NAESB OASIS Subcommittee.
- Vice-Chair of the NAESB WEQ Executive Committee.
- Former Chair of the WECC Market Interface Committee.
- Chair of the Dynamic Scheduling System Operating Committee.
- Member of the wesTTrans OASIS committee.
- Occasional ISAS groupie

Also, Bob is married, has 3 three grown children, and lives in Redmond, WA.

NWPP Corporate Update

Jerry D. Rust joined the Northwest Power Pool January 1, 2001 as President. For the majority of 2000, Jerry consulted on power issues for several software companies. Prior to that, he worked at PacifiCorp for 23 years, where he served as managing director of PacifiCorp's revenue organization and managing director of the transmission systems group. Jerry joined PacifiCorp in 1977 as an engineer and held positions in power resources, financial analysis, field operations, customer service, sales support and national sales.

Mr. Rust was graduated from the University of Wyoming with a degree in electrical engineering. He has furthered his education with numerous courses from various schools (University of Washington, Washington State University, Colorado School of Mines, and others). Jerry is one of the Western Electricity Coordinating Council's North American Electric Reliability Council Operating Committee Representatives.

Solar Magnetic Events

Richard Becker is the Manager of Substation Engineering in Bonneville Power Administration's Transmission Engineering and Technical Services organization, and a licensed professional engineer with a Bachelor of Science degree in Electrical Engineering from the University of Idaho. He has over 26 years experience in substation engineering, operation, and maintenance, and expertise in the areas of system protection & control and substation equipment performance.

What is an ATF Tag?

Amy Lubick has been with NorthWestern Energy since 2005 and in her current position for the past 7 years doing ATF, settlements and numerous reporting and analysis tasks. She serves on the WECC Interchange Scheduling and Accounting Subcommittee and is currently the Chair of the After-the-Fact Work Group. Amy is a graduate of the University of Montana in Accounting. She recently married and lives in Butte, MT with her husband and two teenage step daughters.

BPA's Alternate Scheduling Center

Lou Miranda has been with BPA for over 20 years and has worked in both Power and Transmission Scheduling for over a decade. A graduate of Portland State University, Lou is a native of the Pacific Northwest.

WECC Updates – MIC / NAESB Gas Electric Harmonization

Craig L. Williams has a background in the energy industry starting at the vendor level and progressing through the plant, system, and interconnection levels. Craig worked domestically and internationally with Siemens as a nuclear engineer, worked with PSE&G at the Hope Creek Nuclear Station in southern New Jersey, and worked with PacifiCorp's real-time trading group in Portland, OR. In 2011 Craig joined the Western Electricity Coordinating Council and currently works as the Market Interface Manager.

Craig has Bachelors of Applied Physics from Brigham Young University, a Masters in Nuclear Engineering from the Georgia Institute of Technology, and an MBA in Securities Finance from Portland State University.

PAC/ISO EIM – Status Update

John Apperson has been the trading director at PacifiCorp located Portland, Oregon, since 2000 and is responsible for short and long term trading and scheduling for electricity and natural gas as well as real-time electricity trading and operations. PacifiCorp is the third largest investor-owned utility within the western interconnection and has a robust portfolio of coal-fired, natural gas-fired, hydro, and wind generation serving retail load in six states.

Mr. Apperson has experience in many aspects of the utility industry including merchant operations planning, wholesale marketing, transmission planning, utility distribution operations and planning. He participated in the 2012 Northwest Power Pool energy imbalance market effort and most recently has been involved in the design and development of the California ISO energy imbalance market.

NWPP Meeting MC

ChaRee DiFabio joined the joined the Northwest Power Pool in July 2000. She is currently the Reserve Sharing Group Committee Manager and oversees all related activities of this group as well as the program. Also, she provides support to the NWPP Operating Committee (OC), NWPP Training, various subcommittees and work groups through coordination, meeting facilitation, and informational reporting on behalf of the membership to the internal companies and other organizations such as WECC and NERC.

Prior to working for the NWPP she worked for Idaho Power Company for 5 years at the Boise Bench Substation where she worked with the System Dispatch, After-the-Fact, and the System Scheduling groups.



Andy Meyers
Interchange Scheduling and Accounting
Subcommittee (ISAS) Vice Chair

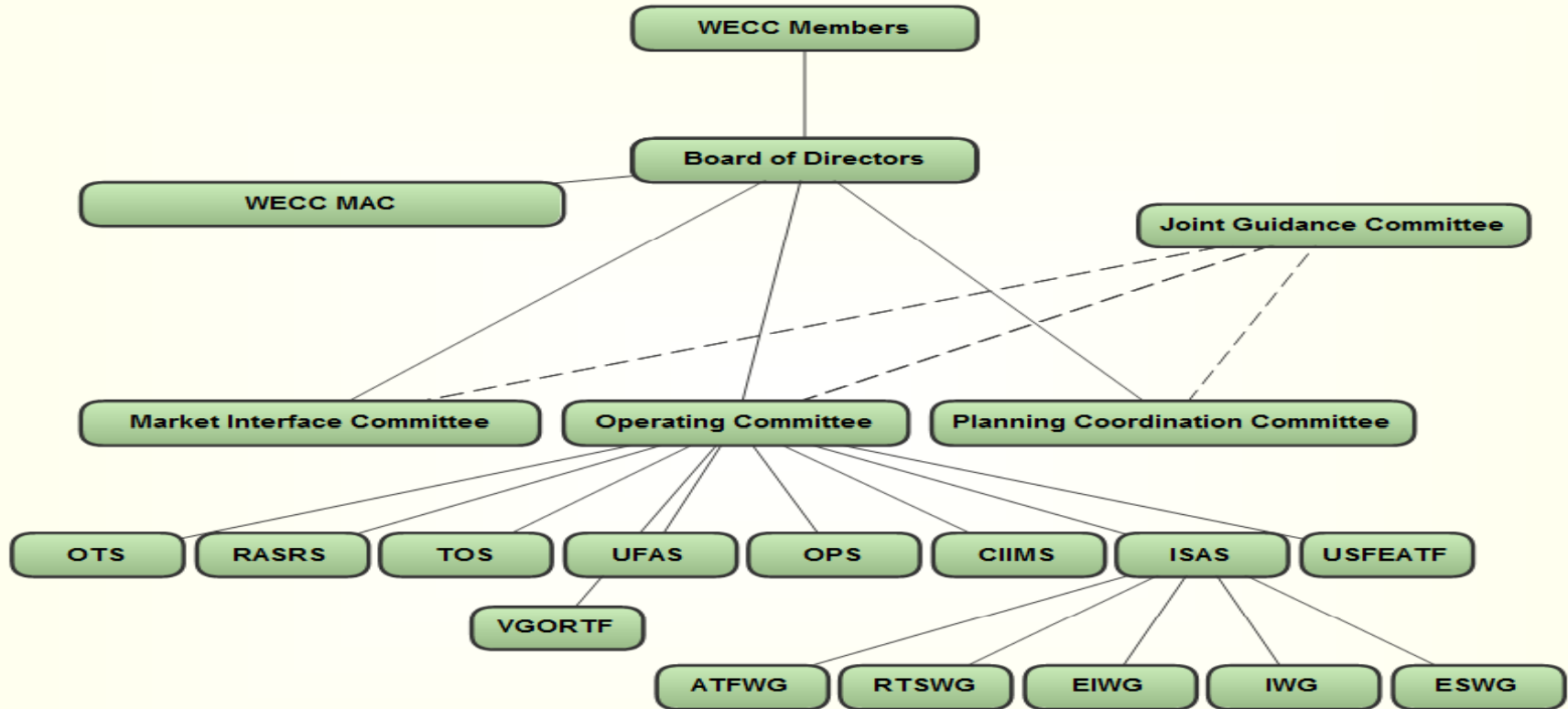
NWPP After-The-Fact & System Schedulers Meeting
October 2013
Portland, OR

Agenda

- What is ISAS
- 2013 Goals
- What Does WECC Bifurcation mean to ISAS
- 2014 WECC Spring Scheduler's Mtg
- Other Forums (NERC & NAESB)
- 2014 Mtg Dates

ISAS Structure

Western Electricity Coordinating Council > Committees



Interchange Scheduling and Accounting Subcommittee



ISAS & Its Work Groups

- ISAS
 - Chair: Brenda Ambrosi, BC Hydro; Vice Chair: Andy Meyers, BPA; Secretary: Kathy Anderson, Idaho Power Company
 - Purpose is to develop regional scheduling and tagging standards, criteria, and guidelines that promote compliance with FERC and NERC
 - Foster development and use of common terminology and methods for scheduling and tagging practices
- After-The-Fact Work Group (ATFWG)
 - Chair: Amy Lubick, NorthWestern Energy
 - Purpose is to research and facilitate resolutions to energy accounting issues
- Real Time Scheduling Work Group (RTSWG)
 - Chair: Mike Pfeister, Salt River Project
 - Purpose is to resolve real time reliability and scheduling

ISAS & Its Work Groups

- E-Tagging Issues Work Group (EIWG)
 - Chair: Lisa Wildes, Gila River Power, LP [aka Entegra Power Group]
 - Purpose is to research and facilitate resolution to identified e-Tag issues relating to reliability
- Regional Interchange Criteria Work Group (IWG)
 - Chair: Danielle Johnson, Bonneville Power Administration
 - Purpose is to develop regional interchange criteria, policies, and guidelines
 - Owner for Annual WIAB test.
- Electronic Scheduling Work Group (ESWG)
 - Chair: Raymond Vojdani, Western Area Power
 - Purpose is to research and facilitate resolution of identified electronic scheduling issues
 - Provide expertise for the WIT, WECC Registry and EIR as well as work with vendor to enhance these business systems

2013 Goals

- ATF Manual
- Guideline for e-Tag Default Ramp Durations
- Implementation of WIAB Test Plan
- Secure ISAS instructors and update WECC System Operator Training class materials for:
 - Interchange
 - Schedulers
- 2013 WECC Spring Schedulers' Meeting
- Documents review
- Modernize existing interchange Regional Criteria

Guideline e-Tag Default Ramp Durations

- Applicable Tag Types
 - Normal, Capacity, Recallable, Emergency, Loss Supply, Dynamic, & Psuedo-Tie
- Request Types
 - New, Curtailment, Reload, Adjustment, Termination, & Extension

Guideline e-Tag Default Ramp Durations

- Ramp
 - NAESB WEQ 004 17.2 – 20 minute ramp (10 before/10 after)
 - Start other than top of the hour – 10 minute
- Exceptions - zero minute ramp
 - reliability limit profile adjustment requests (curtailments)
 - market level profile adjustment requests for Capacity transaction types
 - market level profile adjustment requests for Recallable transaction types
 - both new and market level adjustment requests for Emergency transaction types

Regional Criteria

Regional Criteria	Name	Purpose	Effective Date	Drafting Team	Status
INT-005-WECC-CRT-2	RT Scheduling Emergency Curtailment Procedure			WECC-0086	document should be retired because the bulk of its features are now resident in INT-004-WECC-RBP-2 (for June Board approval) and INT-020-WECC-RBP-1.1. Any remaining features have become less significant since the original April 2007 drafting and no longer warrant a free-standing RBP Out for Ballot-Closes on 10/8/2013
INT-014-WECC-CRT-2	Identification of Contingency Reserves Responsibility	To identify in the e-Tag the reliability entity responsible for carrying Contingency Reserves and the obligation amount so that all parties of the e-Tag have a mutual understanding of contingency Reserve responsibilities and obligations for every Interchange transaction.		WECC-0080	

WECC Bifurcation

- What does WECC bifurcation mean to ISAS
 - WECC divided into Regional Entity (WECC) and Reliability Coordination Company (RCCo)
 - Opportunity to look at our purpose and structure of our subcommittee and review the need and function of our work groups

WECC Spring Scheduler's Mtg

- 2013 Meeting
 - May 6th & 7th in San Diego California
 - Sempra Energy – hosted and provided conference space
 - 54 registered in person attendees
 - 12 webinar participants
 - Location, Location, Location
 - San Diego – not as big a draw as anticipated



WECC Spring Scheduler's Mtg

- Communication Plan & Advertising
 - WECC exploder's reached some but feedback was that many marketer's weren't aware of this year's meeting
- Future of Scheduler's Meeting
 - Every other year or every third year?
 - OC would like to see changes for 2014
 - No Webinar
 - Leverage off another meeting
 - Agenda Committee start earlier



WECC Spring Scheduler's Mtg

- 2014 Scheduler's Meeting
- Looking for an organization to serve as the host.
- Seeking volunteers to participate in the Agenda Committee

Other Forums

- NERC
 - NERC Project 2008-12 Coordinated Interchange Standards
 - Open for 45 day comment – Closes 11/13
- NAESB
 - NAESB Oasis Subcommittee
 - NAESB JESS
 - Etag Reliability Limit Profiles

E-Tag Reliability Profiles

- Only the last reliability limit is retained as part of current profile on etag
- When multiple entities curtail/reload an etag they can override reliability limit
- JESS requested informal comments by 9/6
- JESS will discuss adopting the following recommendation to e-Tag spec
 - Change the profile calculation procedure for reliability limits such that the reliability limit at any point in time is determined by finding the most recent reliability limit for each request author and then taking the lowest of these values

Future ISAS Dates

- 2014 Meeting Dates
 - January 29-30 (workgroup meetings 1/28)
 - April 23-24 (workgroup meetings 4/22)
 - August 20-21 (workgroup meetings 8/19)
- Get involved and participate at WECC or other forums
- Contact Info: Andy Meyers (apmeyers@bpa.gov)

Questions?



Andy Meyers – Bonneville Power

apmeyers@bpa.gov

503-230-3014



Annual WIAB Test

Danielle Johnson

October 15, 2013

NWPP Scheduler Conference

Portland, OR

What is the WIAB Yearly Test?

- A test of the coordinated back-stop scheduling process that protects the reliability of the grid during an Interchange Authority (IA) Emergency or Outage.
 - Testing will be in accordance to the requirements in the WECC Interchange Authority Backup Regional Business Practice (WIAB) INT-020-WECC-RBP-1.1
 - Not all requirements will be tested
 - Primarily the required verbal communication between BA, TP and PSE
 - Testing will be conducted along side day to day business, no outage of IA. No impact to Production!
 - The test requires a minimum of two adjacent BA, one TP in between the two BA, one PSE, in coordination with the RC and WECC



Why do we need to test a Regional Business Practice?

It is a rare event.

- WIAB implemented once in 2012.
 - Known outage.
 - This was for a hardware upgrade.
 - The outage was well known days ahead of time which allowed for the region to be prepared.
 - The last for a 1.30 hours
- A yearly test will provide an opportunity
 - Ensure that the requirements still meet the need
 - BA, TPs, PSE a chance to train staff
 - Identify changes to software, technology, processes and communication, etc....

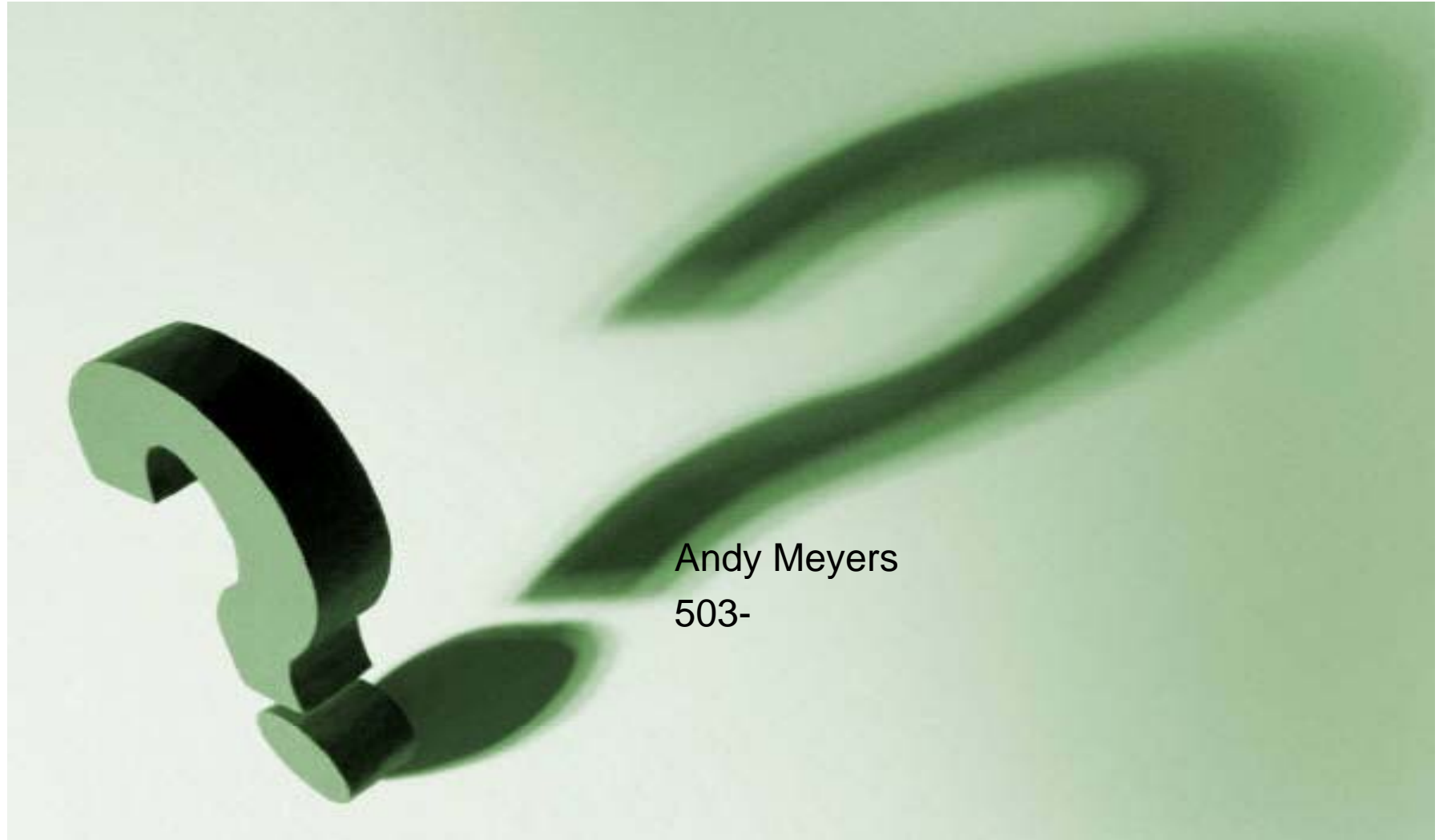
The how in a nutshell

- Test can last up to ~4 hours
- A WECC net message sent stating
 - TEST TEST WIAB INT-20-WECC-RBP-1.1 FOR [DATE] START[TIME] STOP [TIME] TEST TEST
 - WECC will send out a email, couple of weeks prior to, to all WECC members with the date and time of the test a couple of weeks prior to.
- Snap shot production NSI at the beginning of the test. This will be utilized as the starting point of NSI
- Create new transaction.
 - Attachment A Transaction Data Template process
- Submit verbal Adjustments, verbal Curtailment, verbal check outs, other verbal changes

2013 Lucky Candidates

- The test will be done on November 13, 2013
 - BA
 - » Idaho Power
 - » BPA Transmission Services
 - PSE
 - » BPA Power Services
- Additional participants are always welcome. If you would like to volunteer, please contact Danielle Johnson (dmjohnson@bpa.gov)

Questions?



Andy Meyers
503-

Order 764 Presentation

Kathy Anderson, Idaho Power Company

NWPP Schedulers Meeting

October 2013

Portland, OR



Order 764 Task Force Mission

- Order 764 Task Force
 - Created by the Joint Guidance Committee to assess the impacts of 15 minute scheduling in the Western Interconnection and how identified impacts affect the reliability and commercial activities of WECC.
 - Task force to provide complete set of findings and recommendations to JGC no later than March 31, 2013



Task Force Responsibilities

- According to Scope Statement
 - Identify and analyze potential scheduling issues resulting from 15 minute scheduling in the western interconnection including but not limited to seams issues.
 - Review existing WECC, NERC and NAESB guidelines, standards and criteria that may be impacted by Order 764



Task Force Responsibilities (Cont)

- Analyze the effect of 15 minute scheduling on existing tools used in the western interconnection.
- Coordinate the activities of other WECC committees and subcommittees efforts (e.g. UFAS) with respect to order 764
- Explore the need to establish guidelines to respond to 15 minute scheduling in the WECC



Task Force Leadership

- Chair – Kathy Anderson, System Operations Leader, Idaho Power Company
- Vice Chair – Marilyn Franz, Staff Consultant – Transmission Services, NV Energy
 - Membership and meetings were open to all interested stakeholders



Task Force Subgroups

- Subgroups were developed to work on issues to bring back to the larger task force.
 - Coordination of Net Schedule Interchange – Marilyn Franz, NV Energy
 - Questions: Do we check out every 15 minutes? Do we checkout the 15 minute intervals after each hour or the hourly integrated value? Is there possible checkout automation?
 - Group determined what the proposed intra-hour checkouts would look like.

Proposed Checkouts

Net Schedule Interchange		
Horizon	Value	Check Out
Preschedule – 15:00 PPT	Hourly MW - Integrated Value	Always
Real Time Before-the-Hour	Hourly and XX:00-XX:15	Only Upon Change
Real Time Intra-Hour XX:00-XX:15	MW Value	Only Upon Change
Real Time Intra-Hour XX:15-XX:30	MW Value	Only Upon Change
Real Time Intra-Hour XX:30-XX:45	MW Value	Only Upon Change
Real Time Intra-Hour XX:45-XX:00	MW Value	Only Upon Change
Real Time Reliability Curtailments	Hourly Integrated Value	Check after Hour Completes
Real Time After-the-Hour – Hrly NSI	Hourly Integrated Value	Always
After-the-Fact – Hourly NSI	Hourly Integrated Value	Only Upon Change
Net Actual Interchange		
Horizon	Value	Notes
Real Time After-the-Hour	60 Min. Hourly MW Value	Check after Hour Completes
After-the-Fact – Hourly NAI	60 Min. Hourly MW Value	Only Upon Change



Task Force Subgroups (Cont)

- Transmission Pre-emption Intra-hour – Kathee Downey, PacifiCorp
 - What is required for intra-hour schedules if the path becomes overscheduled? Are curtailments required every 15 minutes as path schedules change?
 - **Recommendation will be that curtailments will occur prior to the hour for the entire hour and then for the next 15 minute intervals if path becomes overscheduled during that time.**



Task Force Subgroups (Cont)

- Interaction with Market Structures and Seams Issues with CAISO – Jim Price, CAISO
 - CAISO has an automated process for real time unit commitment – market optimization process – used by market participants to make adjustments.
 - Information on the CAISO process can be found on the CAISO website.



Existing Document Review

- The task force reviewed NERC, WECC, and NAESB documentation to see if there are any impacts with 15 minute scheduling.
 - Some inconsistencies with timing tables in the NERC Standards with “on time” tags and the OATT 20 minute before the “scheduling interval”. Standards say 10 minutes before the ramp.
 - This is in the process of going through the NERC process to be updated.

Integration of Schedules “Rounding Issue”

- An issue with sub-hourly schedule rounding has been identified where total schedules could exceed total transmission reservations. While this is not expected to cause reliability issues intra-hour, concerns exist for possible manipulation of sub-hourly schedules and after-the-fact with compliance, billing, and settlement
- A Survey was sent out to ask the task force members their opinions.



Rounding Survey

- Make no changes and round sub-hourly schedules according to existing rules.
- Truncate any schedule that is less than an hour in duration when computing the MW value for the hour (e.g. 2.5MW would become 2 MW).
- Require that sub-hourly schedules and sub-hourly schedule changes must be done in increments of 4MW to eliminate hourly rounding concerns.



Rounding Survey

- Round up during the 1st and 3rd intra-hour scheduling interval and round down during the 2nd and 4th intervals.
- Adjust the accounting values to include a 1/10th of a MW. (e.g. 2.1MW, 2.2MW etc., would be okay)



Rounding Survey

- The survey was distributed to the task force exploder on January 8, 2013.
- Comment period was open until January 30, 2013.
- Results indicated that the majority said to leave as it stands, there was some interest in having WECC explore the option of 1/10th MW accounting.



Order 764-A

- On December 20, 2012, FERC released Order 764-A.
 - Deadline for compliance has been moved from September 11, 2013 to November 12, 2013.
 - Confirmed that intra-hour scheduling applies to ALL transmission customers that schedule under the OATT (network and PTP)



Order 764-A

- Confirmed that schedules for firm transmission service will continue to have curtailment priority over schedules for non-firm transmission service.
- This eliminates the “no bumping” rule many Transmission Service Providers in the Western Interconnection have today.



Initial Recommendations

- 15-minute scheduling intervals will be xx:00-xx:15, xx:15-xx:30, xx:30-xx:45, and xx:45-xx:00.
- Intra-hour Transactions will allow use of firm and non-firm TSRs.
- Intra-hour Transactions will allow use of new or existing TSRs.
- Intra-hour Transactions will allow use of redirects, either firm or non-firm.
- E-Tags submitted in Pre-schedule may be submitted with 15-minute interval scheduling (customer discretion)



Initial Recommendations

- Firm transmission use would preempt non-firm transmission use if submitted at least 20 minutes before the impacted scheduling interval. Non-firm transmission use of a higher priority would preempt non-firm transmission use of a lower priority if submitted at least 20 minutes before the impacted scheduling interval.
- Requests for Interchange (e-Tags) must be submitted at least 20 minutes prior to the start of the scheduling interval to be considered "On-Time" (not "Late").



Initial Recommendations

- A Request for Interchange that is Late (submitted with less than 20 minutes prior to the impacted scheduling interval's start time) will be marked as Late. ***Revise NERC timing tables to make this occur.**
- If needed, Reliability Limits (curtailments) will occur prior to the top of the hour (as they do today) for all scheduling intervals in the upcoming hour that exceed a path scheduling limit, and Reliability Limits (curtailments/reloads) will occur within the hour as needed.



Initial Recommendations

- At a minimum, ATC will continue to be calculated as Transmission Service Providers currently calculate today. Order 764 neither requires Transmission Service Providers to provide an intra-hour transmission service product nor does it require more frequent calculations of ATC than what occurs today. However, FERC did not preclude a Transmission Service Provider from offering a sub-hourly product if they choose.



Initial Recommendations

- The top of the hour ramp would remain 20 minutes. Ramp duration for the 15-minute scheduling intervals would be a 10-minute straddle ramp.
- Balancing Area Checkouts will be as reflected in the slide above.



Impacts on Unscheduled Flow

- UFAS does not plan on moving from the current hourly process to a 15-minute interval. Any new schedules submitted in the hour will be assessed by the webSAS tool to determine the impact on the current USF Event. If the tool determines that the transaction creates a negative impact based on the TDF of the transaction, the intra-hour transaction will be curtailed by the tool. This is how it works today for any hourly e-Tag submissions. The tool will work the same for any intra-hour e-Tag as well.



Impacts on EMS Systems

- The Order 764 Task Force recognizes that some entities will need to modify how often the NSI value is pulled into their EMS systems and controlled to. With the implementation of 15-minute scheduling, entities should ensure their EMS systems are pulling in NSI values upon change to control to these value changes within the hour.

Questions



PacifiCorp & FERC Order 764 Final Ruling

Grid Operations – Portland Control Center



— *presented by* —

Kathee Downey, Manager – Transmission Grid Operations
PacifiCorp

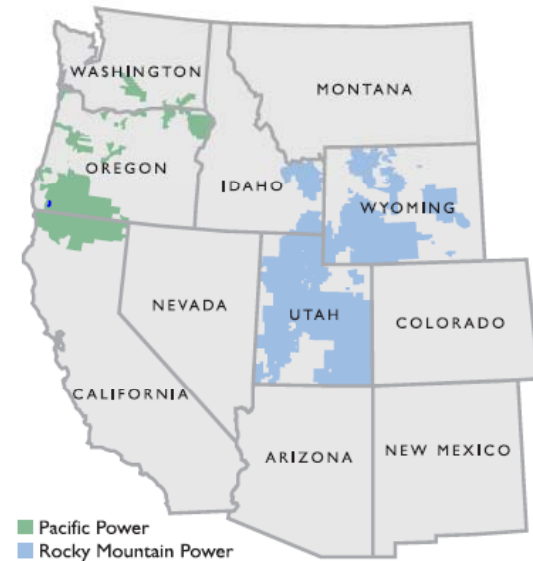
Transmission Grid Operations



Facts About Us ...

- ❖ 1.8 million customers across 136,000 square miles
 - Oregon, Washington, California, Utah, Wyoming, Idaho
- ❖ 6,300 employees
- ❖ Total Generation = 10,579 MW
- ❖ Total Transmission = 16,200
- ❖ Tag Requests per Month = 26,000
- ❖ Tags Per Hour = 300 to 500

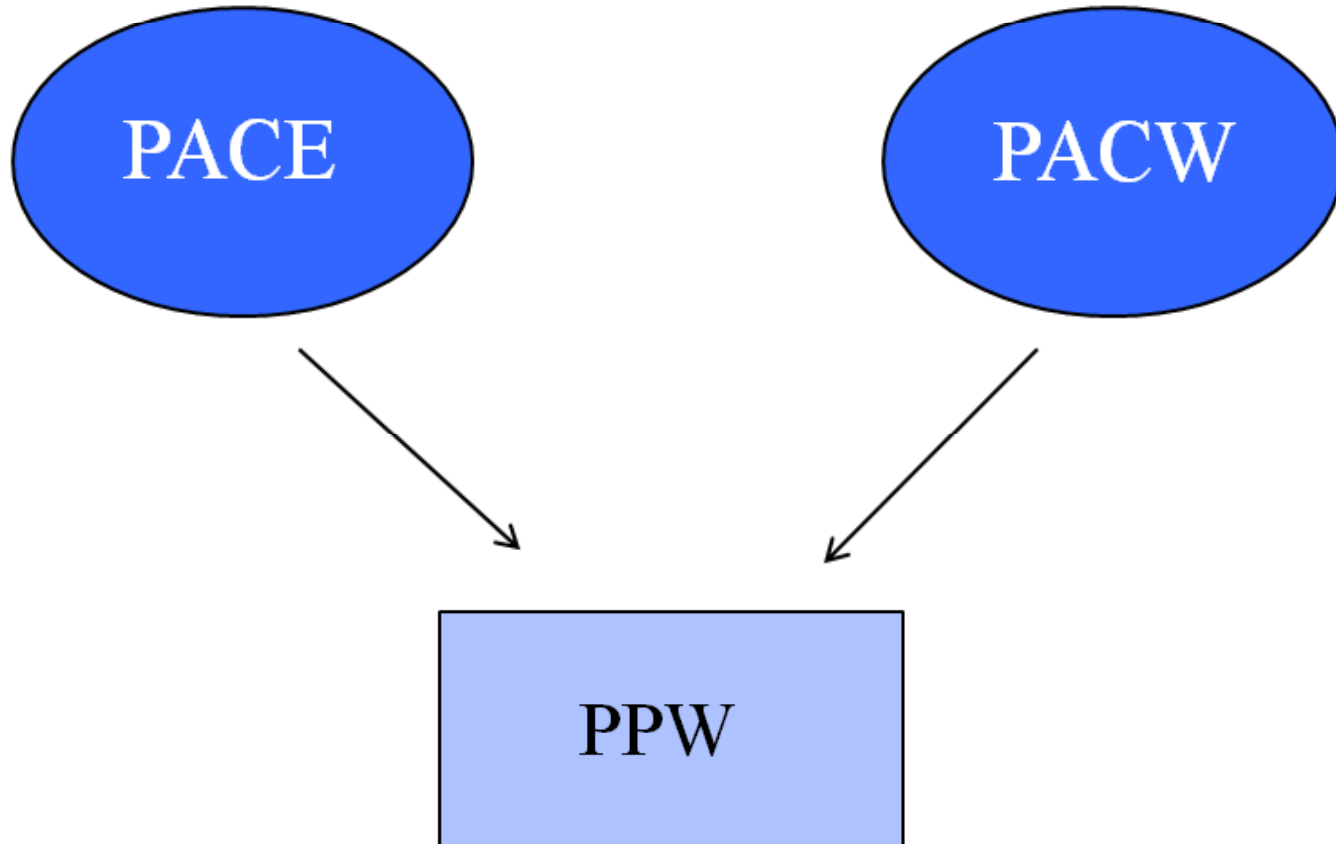
Service area



Transmission Grid Operations



More About Us ...



Balance & Interchange Operators

- ❖ E-Tag Management
- ❖ Transmission Contingency Mitigation
- ❖ Path Limit Monitoring
- ❖ Schedule Curtailments
- ❖ Generation Disturbance Recovery
- ❖ Metered Tie Administration
- ❖ Hourly Schedule Checkout
- ❖ AGC and ACE Management
- ❖ USF Monitoring

FERC Order 764 Compliance

- ❖ **New Desk**
 - Hired 3 new FTE's
 - Will this be enough?
- ❖ **Split Responsibilities**
 - Transmission & Congestion Management
 - Real-Time Tagging and Contingencies
- ❖ **9-person / 9-week rotation**
- ❖ **Tool Upgrades**
- ❖ **Business Practice Updates**

Questions?



Transmission Grid Operations Overview

Portland Control Center – Grid Operations

Electric Industry Registry

Northwest Power Pool's
ATF-System Schedulers Meeting
October 15, 2013

Bob Harshbarger, Puget Sound Energy





Electric Industry Registry

- Registry History
- EIR Development
- EIR Content
- Registry Concepts
- Publications
- Access
- Schedule

Electric Industry Registry History

■ TSIN (~1998-2001)

- Transmission System Information Network
- Centralized registry supporting OASIS and e-Tag
- Developed and maintained by NERC

■ TSIN (2005-2006)

- Industry needed additional flexibility in registry
- NERC's primary mission was changing
- NAESB developing as organization

Electric Industry Registry History

■ EIR Development

- System requirements document by Joint Electric Scheduling Subcommittee in 2006
- RFPs by NAESB in early 2010
- Contract awarded to OATI in 2010
- Cut-over from TSIN in November 13, 2012
- Phase 3 – migration of WECC adjacency data

Electric Industry Registry Content

- Topology Information
 - Interconnections
 - Control Zones
 - Source/Sink Points
 - POR/POD Points
 - Flowgates
 - Adjacency Information

Electric Industry Registry Content

- Entity Information
 - Code/Roles
 - Purchasing/Selling Entities
 - Regional Entities
 - Reliability Coordinators
 - Market operators
 - Balancing Authorities
 - Transmission service providers

Electric Industry Registry Content

- Approved Certificate Authorities
 - PKI (secure communications)
- e-Tag Information
 - Agent, Approval, Authority Service URLs

Electric Industry Registry Concepts

- Maintain Your Data

- People.
- Phone numbers.
- Email addresses.
- Points of service.

Electric Industry Registry Concepts

■ Approval

- Most objects require approval by an entity other than the registering entity.
- Some approvals have been automated.
- Objects with a manual approval typically have a Pending status for five (5) days.
- If approval is not obtained, the object is deleted

Electric Industry Registry Concepts

■ Parent-Child

- A registered entity enters Code/Role registration
 - PSEI registers PSEI the BA
- A TSP enters a POR
 - PSEI registers the service point PSEI.SYSTEM
- Multiple parents – a POD and a Sink make-up a POD/Sink adjacency
 - PSEI.SYSTEM-PSEISYS

Electric Industry Registry Concepts

■ Start-Stop Date

- Through-out the registry there are start and stop dates for each object
- Some child start and stop dates must be “within” the parent(s) start and stop dates
- These dates determine when the object is included in the active publication
- If you are serving a load starting September 1st, the Sink point needs a registry start date of August 31st or before (actual registration recommended 1 week in advance)

Electric Industry Registry Publications

- Includes a Pending and an Active Registry
- Nightly, Monday through Friday, 12:02 am CST (exceptions for 6 holidays)
- CSV, MDB, and XML formats
- Emergency Publications
 - Existing manual process
 - New automated process under development

Electric Industry Registry Access

- NAESB

- OATI

Electric Industry Registry Access

- NAESB Registry Owner
- EIR Business Practice Standards
- Process for Registry Enhancements
- http://www.naesb.org/weq/weq_eir.asp

Electric Industry Registry Access



Wholesale Electric
Retail Electric | Wholesale Gas | Retail Gas



North American Energy Standards Board

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WEQ Electric Industry Registry (EIR):

Please note that we have started posting all files in editable format. If you experience problems accessing the formatted document, please call the NAESB office (713-356-0060) and it will be provided to you in Adobe Acrobat (pdf) format.

[WEQ EIR Enhancement Requests](#)

[October 11, 2013 - EIR / webRegistry Phase 3 WECC Cutover Date Rescheduled](#)

[September 26, 2013 - EIR / webRegistry Phase 3 Publication Cutover Date Announcement](#)

[September 13, 2013 - EIR / webRegistry Phase 3 October Cutover Date Announcement](#)

[May 24, 2013 - Learn More About webRegistry Phase 3 Changes and Needed Entity Action](#)

[April 22, 2013 - OATI webRegistry Phase 3 Announcement](#)

[webRegistry Technical Guide Version 2.1](#)

Date	Event/Location	Agenda	Minutes	Misc.
June 24, 2013	Electric Industry Registry Information Session Webinar	3:00pm - 4:00pm (Central)		Information Session Presentation
June 6, 2013	Electric Industry Registry Information	2:00pm - 3:00pm (Central)		Information Session Presentation

Electric Industry Registry Access

- OATI Registry Administer
- Hosts the website
- Need Digital Certificate
- Annual Registration Fee
- Maintains Help Documents 
- OATI - <https://www.naesbwry.oati.com/>

Electric Industry Registry Access



[Registered user? Click here to login.](#)

[Not a registered user? Click here to apply.](#)

Note: If you already have a digital certificate you will not need to obtain an additional digital certificate in order to access the webRegistry system.



NOTICE TO USERS

This is a restricted software application and is for authorized use only.

All uses of this system are logged, and the logs may be provided for use by appropriate law enforcement or regulatory agencies.

Unauthorized or improper use of this system may result in immediate termination of access and notification to appropriate authorities. By continuing to use this system you indicate your awareness of and consent to these terms and conditions of use. LOG OFF IMMEDIATELY if you do not agree to the conditions stated in this Notice.

Electric Industry Registry Schedule

- OATI Certificate Upgrade October 15, 2013
- WECC Adjacency Data October 29, 2013
- 1.8.1.1 cut-over November 5, 2013
- CSV/MDB Retirement November 12, 2013
- Auto Emergency Publication December 3, 2013

Electric Industry Registry

Questions?

NORTHWEST POWER POOL

Reliability through Cooperation

2013



Presentation Outline

- Northwest Power Pool Corporation Review
- Status of NWPP Training Activities
- Update on the NWPP Membership – 4 main Committees
- Other Activities – New Balancing Authority
- NERC Standards
- Questions
- TEST - NOT



Vision

Helping the Northwest Power Pool members work together to maintain a reliable and secure Interconnection – today and in the future



History

- First pooling of resources in the Northwest occurred in 1917
- NWPP formed in 1941 by 6 investor-owned utilities
 - 3 staff engineers
- An impetus from the War Production Board in 1942
 - Ten major private utility systems and Bonneville Power Administration
 - Pooled resources to provide power to the war industries
- Maintained after WWII for reliability and coordination

Chronology

- 1941 – Operating Committee (OR, WA, MT, UT, ID)
- 1942 – BPA joined (superpool)
- 1949 – British Columbia Hydro & Power Authority joined
- 1961 – Columbia River Treaty with Canada
- 1964 – Pacific Northwest Coordination Agreement (PNCA) signed –
Coordinating Group
- 1970 – Contingency Reserve Sharing
- 1990 – Transmission Planning Committee
- 1995 – Formalized Membership Agreement
- 1997 – New PNCA
- 1999 – NWPP Incorporated as a non-profit corporation
- 2002 – Automation of the Contingency Reserve Sharing –AGC driven, 20
Balancing Authorities
- 2005 – NERC Certified Trainer
- 2008 – Agreement Appointing Agent and Establishing Responsibilities
Related to Reserve Sharing Group Compliance with BAL-002
- 2008 – General Services Agreement

NWPP Corporation Training

- NWPP is a NERC qualified provider of continuing education hours
- Courses
 - Reserve Sharing (4 CEH)
 - Underfrequency Load Shedding (2 CEH)
 - Time Error Control (1 CEH)
 - Frequency Management (1 CEH)
 - Voltage Issues (2 CEH)
 - Reserve Sharing simulation (1CEH)
 - Annual Energy Emergency Planning (EEP) (1CEH)
 - Annual EEP simulation (1CEH)



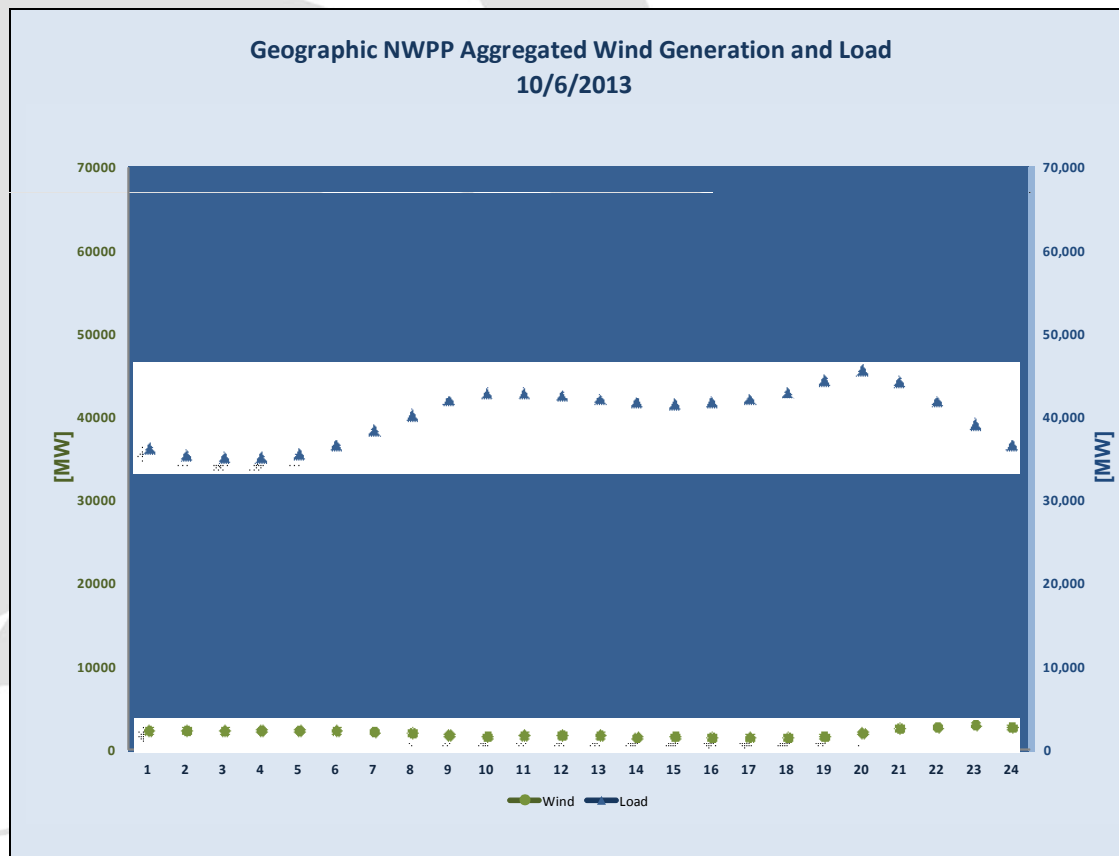
NWPP Corporation Training

- Developing on-line training to be available sometime first quarter 2014 – NWPP website
 - 20 hours of NERC CEH training
 - 50 plus hours of NERC CEH training by July 2014
 - Working with NWPP members for subject matter experts
 - Exploring relationships with third parties

NWPP Corporation - Information

Daily Wind data for the NWPP Area

www.nwpp.org/our-resources/NWPP-Reserve-Sharing-Group/Aggregated-NWPP-Geographic-Area-Wind



Northwest Power Pool Corporation

- www.nwpp.org



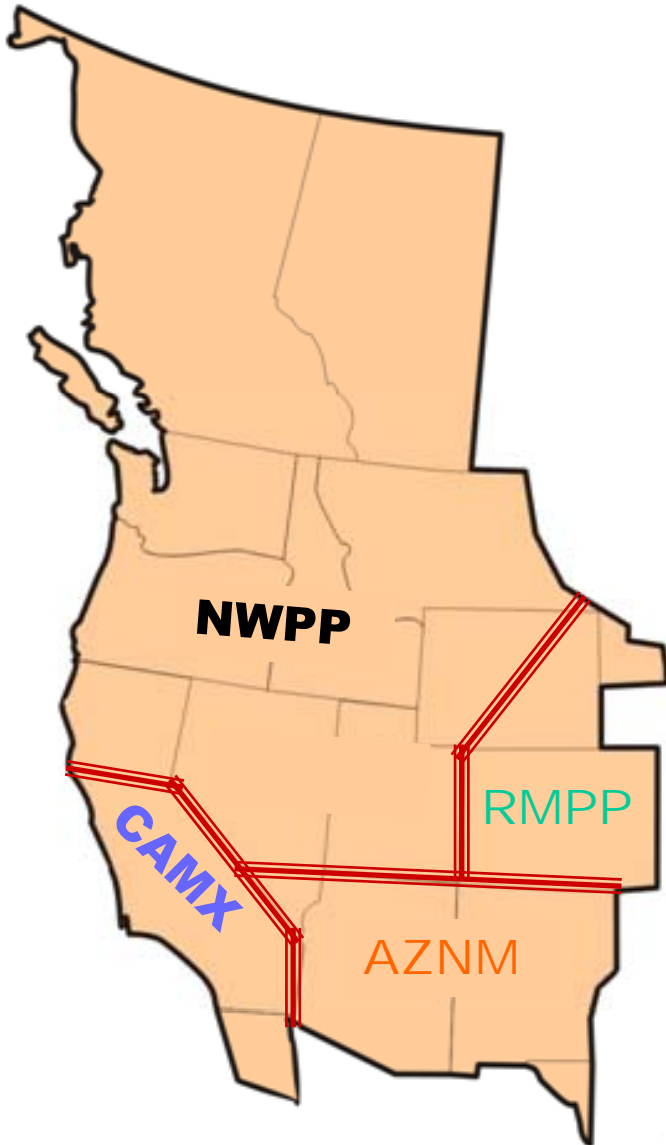
NORTHWEST POWER POOL

Membership

*Currently 34
Members*



NERC/WECC BAs by Sub-regions



Northwest Power Pool

Alberta Electric System Operator
 Avista Corporation
 Balancing Authority of Northern California
 Bonneville Power Administration
 British Columbia Hydro Association
 Chelan County PUD
 Douglas County PUD
 Grant County PUD
 Idaho Power Company
 NaturEner Power Watch – Wind Energy
 NaturEner Wind Watch – Wind Energy
 Northwestern Energy
 PacifiCorp-East
 PacifiCorp-West
 Portland General Electric Company
 Puget Sound Energy
 Seattle City Light
 Sierra Pacific Power Company
 Tacoma Power
 Turlock Irrigation District
 Western Area Power Administration – UGP

Rocky Mountain Power Pool (RMPP)

Public Service Company of Colorado
 Western Area Power Administration – CM

Arizona-New Mexico (SRSG)

Arizona Public Service Company
 CECD – Arlington Valley
 CECD – Griffith
 CECD – Harquahala
 CECD – Panda Gila River
 El Paso Electric Company
 Imperial Irrigation District
 Nevada Power Company
 Public Service Company of New Mexico
 Salt River Project
 Tucson Electric Power Company
 Western Area Power Administration – LCR

California-Mexico

California Independent System Operator
 Comision Federal de Electricidad
 Los Angeles Dept. of Water and Power

Demographics in NWPP Electrical/Geographic Area

- 8 U.S. States
- 2 Canadian Provinces
- Federal, Public, Private, Provincial Ownership
- International Border (Treaties associated with water)
- Non-Jurisdictional as well as Jurisdictional
- Preference Act – Public Law 88-552
- 160 Consumer-owned electric utilities
- 21 Operating Balancing Areas (38 in the Western Interconnection (WI))
- ~ 110,000 Megawatts Total Resources (44% WI)
- ~ 50% Peak load of the WI
- ~ 50% Energy load of the WI
- Automated Reserve Sharing Procedures
- Hydro Coordination
- Hydro Thermal Integration
 - *Hydro located on the West (BC, ID, OR, WA)*
 - *Thermal located on the East (AB, MT, NV, UT, WY)*

Four Main Membership Committees

- **Operating Committee**
 - Foster coordination and communication.
- **Coordinating Group**
 - Administer the Pacific Northwest Coordination Agreement, optimizing Columbia Basin hydro generation.
- **Transmission Planning Committee**
 - Provide a forum for reliable transmission planning.
- **Reserve Sharing Group Committee**
 - Administer and address Contingency Reserve.

PNCA Coordination – Coordinating Group Current Activities

- **Kerr Project**
 - Energy Keepers, a corporation of the confederated Salish and Kootenai tribes is preparing to take over the Kerr project from PPL-Montana in August of 2014
 - Energy Keepers will join the PNCA
- **Actual Energy Regulation (AER)**
 - Publishing of the bi-monthly AER
- **Annual Planning Cycle**
 - Preliminary, Modified, Final and Headwater Payment regulation plus the necessary axillaries studies
- **Mid-Columbia Hourly Coordination**
 - Monthly Operating Group meetings
 - New Agreement – Existing expires 6-30-2017

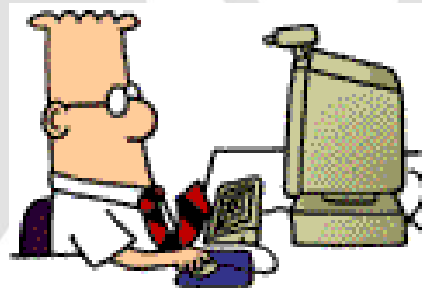
Transmission Planning Committee

Current Activities

- Serve as a Forum for open discussion
- Training
 - 2014 Engineers' Forum
 - Continuing Education
- Contingency Reserve
 - Incorporating reserve into the planning models
- Base Case Coordination System
 - Reviewing process to assure proper submittals

Transmission Planning Committee and Operating Committee

- Northwest Operational Planning Study Group (NOPSG)
 - Seasonal path operating studies



Reserve Sharing Group Committee Current Activities

- Unit Contingent Transaction
 - Incorporation into the NWPP Reserve Sharing Program
- System Visibility
 - Program expansion incorporating all transmission lines with the NWPP area
- BAL-002-WECC-2
 - Modifying existing documentation to incorporate the new BAL-002-WECC-2
- BAL-003
 - Evaluation frequency response reserve sharing groups

Operating Committee Current Activities

- Resolution of Firm-For-The-Hour
 - Is it still necessary in today's world?
 - Antitrust Issues
- Under-frequency Load Shedding
 - Participating on the WECC UFLSRG
- Outage Coordination Process
 - Identifying facilities and timing issues
- NWPP Transmission Maps
 - Electronic Version

Other OC Services

- NERC
 - Active participation
 - Coordinated information, discussions, interpretations and responses
- WECC
 - Coordinated discussions concerning new WECC Standards, interpretations and responses

Other Activities

- Incorporation of new Balancing Authority
 - **Constellation Energy Control and Dispatch**
 - *Member of both the Operating Committee and, when operational, a member of the Reserve Sharing Group Committee*



NERC Standards Development



Standards Subject to Future Enforcement – 15

(CIP) Critical Infrastructure Protection – 8

- CIP-002-4 Critical Cyber Asset Identification
- CIP-003-4 Security Management Controls
- CIP-004-4a Personnel & Training
- CIP-005-4a Electronic Security Perimeter(s)
- CIP-006-4c Physical Security of Critical Cyber Assets
- CIP-007-4a Systems Security Management
- CIP-008-4 Incident Reporting and Response Planning
- CIP-009-4 Recovery Plans for Critical cyber Assets

NERC Standards Development

(EOP) Emergency Preparedness and Operations – 1

- EOP-004-2 Event Reporting

(FAC) Facilities Design, Connections, and Maintenance – 3

- FAC-001-1 Facility Connection Requirements
- FAC-003-2 Transmission Vegetation Management
- FAC-003-3 Transmission Vegetation Management

(PRC) Protection and Control -2

- PRC-004-2.1a Analysis and Mitigation of Transmission Generation Protection System Mis-operations
- PRC-005-1.1b Transmission and Generation protection System Maintenance and Testing

NERC Standards Development

(VAR) Voltage and Reactive – 1

- VAR-001-3 Voltage and Reactive Control

NERC Standards Development



Standards Filed and Pending Regulatory Approval – 54

(BAL) Resource and Demand Balancing – 5

- BAL-001-1 Real Power Balancing Control Performance
- BAL-002-1a Disturbance Control Performance
- BAL-002-WECC-2 Contingency Reserve (WECC)
- BAL-003-1 Frequency Response and Frequency Bias Setting
- BAL-004-WECC-02 Automatic Time Error Correction

NERC Standards Development

(CIP) Critical Infrastructure Protection – 10

- CIP-002-5 BES Cyber System Categorization
- CIP-003-5 Security Management Controls
- CIP-004-5 Personnel & Training
- CIP-005-5 Electronic Security Perimeter(s)
- CIP-006-5 Physical Security of Critical Cyber Assets
- CIP-007-5 Systems Security Management
- CIP-008-5 Incident Reporting and Response Planning
- CIP-009-5 Recovery Plans for Critical cyber Assets
- CIP-010-1 Configuration Change Management and Vulnerability Assessments
- CIP-011-1 Information Protection

NERC Standards Development

(IRO) Interconnection Reliability Operations and Coordination - 4

- IRO-001-3 Responsibilities and Authorities
- IRO-002-3 Analysis Tools
- IRO-005-4 Current Day Operations
- IRO-014-2 Coordination Among Reliability Coordinators

NERC Standards Development

(MOD) Modeling, Data, and Analysis – 9

- MOD-011-0 Maintenance and Distribution of Steady-State Data Requirements and Reporting Procedures
- MOD-013-1 Maintenance and Distribution of Dynamics Data Requirements and Reporting Procedures
- MOD-014-0 Development of Steady-State System Models
- MOD-014-0 Development of Dynamics System Models
- MOD-024-1 Verification of Generator Gross and Net Real Power Capability
- MOD-025-01 Verification of Generator Gross and Net Reactive Power Capability
- MOD-025-2 Verification and Data Reporting of Generator Real and Reactive Power Capability and Synchronous Condenser Reactive Power Capability

NERC Standards Development

(MOD) Modeling, Data, and Analysis – 9 continue

- MOD-026-1 Verification of Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions
- MOD-027-1 Verification of Models and Data for Turbine/Governor and Load Control or Active Power/Frequency control Functions

(PRC) Protection and Control – 11

- PRC-001-2 System Protection Coordination
- PRC-002-1 Define Regional Disturbance Monitoring and Reporting Requirements
- PRC-003-1 Regional Procedure for Analysis of Misoperations of Transmission and Generation and Protection Systems
- PRC-005-2 Protection system Maintenance

NERC Standards Development

(PRC) Protection and Control – 11 continue

- PRC-012-0 Special Protection System Review Procedure
- PRC-013-0 Special Protection System Database
- PRC-014-0 Special Protection System Assessment
- PRC-019-1 Coordination of Generating Unit or Plan Capabilities, Voltage Regulating Controls, and Protection
- PRC-020-1 Under Voltage Load Shedding Program Database
- PRC-024-1 Generator Frequency and Voltage Protective Relay Settings
- PRC-025-1 Generator Relay Loadability

NERC Standards Development

(TOP) Transmission Operations – 4

- TOP-001-2 Transmission Operations
- TOP-002-3 Operations Planning
- TOP-003-2 Operational Reliability Data
- TOP-006-3 Monitoring System Conditions

(TPL) Transmission Planning – 10

- TPL-001-2 Transmission System Planning Performance Requirements
- TPL-001-3 System Performance Under Normal (No Contingency) Conditions (Category A)
- TPL-001-4 Transmission System Planning Requirements
- TPL-002-2b System Performance Following Loss of a Single Bulk Electric System Element (Category B)

NERC Standards Development

(TPL) Transmission Planning – 10 continue

- TPL-003-2a System Performance Following Loss of Two or More Bulk Electric System Elements (Category C)
- TPL-003-2b System Performance Following Loss of Two or More Bulk Electric System Elements (Category C)
- TPL-004-2 System Performance Following Extreme Events Resulting in the Loss of Two or More Bulk Electric System Elements (Category D)
- TPL-004-2a System Performance Following Extreme Events Resulting in the Loss of Two or More Bulk Electric System Elements (Category D)
- TPL-005-0 Regional and Interregional Self Assessment Reliability Reports
- TPL-006-0 Data From the Regional Reliability Organization Needed to Assess Reliability

NERC Standards Development



Standards Filed and Pending Regulatory Filing - 8

(BAL) Resource and Demand Balancing – 1

- BAL-001-2 Real Power Balancing Control Performance

(CIP) Critical Infrastructure Protection – 1

- CIP-002-3b Critical Cyber Asset Identification

(COM) Communications – 3

- COM-001-2 Communications
- COM-002-2a Communication and Coordination
- COM-002-3 Communication and Coordination

NERC Standards Development

(IRO) Interconnection Reliability Operations and Coordination – 1

- IRO-006-WECC-2 Qualified Transfer Path Unscheduled Flow (USF) Relief

(MOD) Modeling, Data, and Analysis – 1

- MOD-105-0.1 Development of Dynamics System Model

(TPL) Transmission Planning – 1

- TPL-006-0.1 Data From the Regional Reliability Organization Needed to Assess Reliability

NERC Standards Development

- February 12, 2013 - NERC submits a petition of the North American Electric Reliability Corporation seeking approval of the proposed interpretation of BAL-002-1.
 - Status – FERC “proposes to remand NERC’s interpretation of BAL-002-1 because it fails to comport with the Commission approved requirement that interpretations can only clarify, not change, a Reliability Standard.” Sixteen entities filed comments. Now awaiting FERC response.
- February 26, 2013 - NERC submits a Joint Petition of the North American Electric Reliability Corporation and Western Electricity Coordinating Council for Approval of WECC Regional Reliability Standard BAL-004-WECC-02 — Automatic Time Error Correction. BAs will be allowed to use ATEC ACE as their Reporting ACE and limits accumulations of Primary Inadvertent Interchange.
 - Status – awaiting FERC response.

NERC Standards Development

- March 29, 2013 - NERC submits a petition for Approval of Reliability Standard BAL-003-1 – Frequency Response and Frequency Bias Setting. The proposed standard ensures that each of the Interconnections have sufficient Frequency Response to guard against underfrequency load shedding (“UFLS”) due to a loss of resources in that Interconnection.
 - Status - FERC responded with a NOPR. Industry is commenting.
- April 12, 2013 - NERC submits a Joint Petition of the North American Electric Reliability Corporation and Western Electricity Coordinating Council for Approval of WECC Regional Reliability Standard BAL-002-WECC-2, Contingency Reserve.
 - Status – FERC responded with a NOPR. WECC has commented.

NERC Standards Development

- April 16, 2013 - NERC submits a Petition for Approval of revised Reliability Standard IRO-005-4 – Current Day Operations. RC Monitoring of CPS and DCS has been removed.
 - **Status - awaiting FERC response.**
- On September 6, 2013 NERC posted BAL-002-2, Contingency Reserve for Recovery from a Balancing Contingency Event, for a non-binding poll. The ballot period was extended one additional day to achieve a quorum.
 - **Status – The ballot only achieved 58.23% approval. The drafting team is responding to comments and revising their proposal.**

NERC Standards Development

- Challenges – The world continues to evolve ~ 80 Standards to be implemented with changes.
- Technology Changes – As the industry embraces new technology to .timely provide more information designed to improve reliability, the industry continues to evolve.
- Costs – As the industry evolves, the costs continues to increase

NERC Standards Development

Calm, Patience, and Understanding

We must all get along



QUESTIONS?



Northwest Power Pool Corporation

- www.nwpp.org



NWPP
After-the-Fact – System
Schedulers Meeting
Quiz - Answers

2013

1. List at least 2 types of service the NWPP Corporation Provides:

- *Training,*
- *Programs (Support of Committees)*
- *Reporting (RSG)*
- *Corporate (corporate management services to the industry, specializing in efficiently assisting power utility organizations in successfully accomplishing their goals, objectives, and obligations.)*

2. Define the Acronym for each of the following: EIWG, IWG, & ESWG

- *(EIWG) E-Tagging Issues Work Group*
- *(IWG) Interchange Criteria Work Group*
- *(ESWG) Electronic Scheduling Work Group*

3. What was the purpose the Joint Guidance Committee's Order 764 Task Force?

- *The purpose of the task force was to assess the impacts of 15 minute scheduling in the Western Interconnection and how identified impacts affect the reliability and commercial activities of WECC*

4. Start-Stop dates are important to the EIR because:

- a) These dates determine when the object shall be excluded from active publication.
- b) These dates determine when the object is included in active participation.
- c) Some parent start and stop dates must be “within” the child(rens) start and stop dates.

b) These dates determine when the object is included in active participation.

5. Define the acronym GMD, and in the world of electricity and why is it a concern?

- *Geomagnetic Disturbance*
- *This kind of disturbance poses risk to BES causing voltage stability problems and etc...*

6. What year was the NWPP initially formed?

a) 1934

b) 1952

c) 1995

d) 1941

d) 1941

7. Some common Reasons for use of ATF

Tags are:

- a) Missing or incorrect Point of Receipt or Point of Delivery**
- b) Curtailment Issues**
- c) Incorrect generator on tag**
- d) a, b, & c**
- e) a & b only**
- f) None of the above?**

d) a, b, & c

8. True or False – BPA’s new ASC will be located the Munro Scheduling Center.

True – BPA’s new ASC will be located in Spokane, WA.

9. What are the demographics of the NWPP – where does it operate?

List the number of States _____ and number of Canadian provinces_____

- *8 U.S. States*
- *2 Canadian Provinces*

10. Solve the word jumbles just below:

- **CWEC tnciirBfauto**
- **uehddcelUsln wlfo**
- **esonigoctn aneemtngma**

- *WECC Bifurcation*
- *Unscheduled flow*
- *Congestion management*

**11. When is the next scheduled Portland
Timbers next game and is it at home or
away?**

10.19.2013 @ 7:30 p.m. - Home

12. List the four main committees of the NWPP.

- *Coordinating Group – some would say PNCA*
- *Operating Committee*
- *Reserve Sharing Group Committee*
- *Transmission Planning Committee*



Bonneville Power Administration

Solar Magnetic Events

GMD/GIC Overview

Richard Becker

Manager, Substation Engineering

October 16, 2013

NWPP After-the-Fact and
System Scheduler Meeting





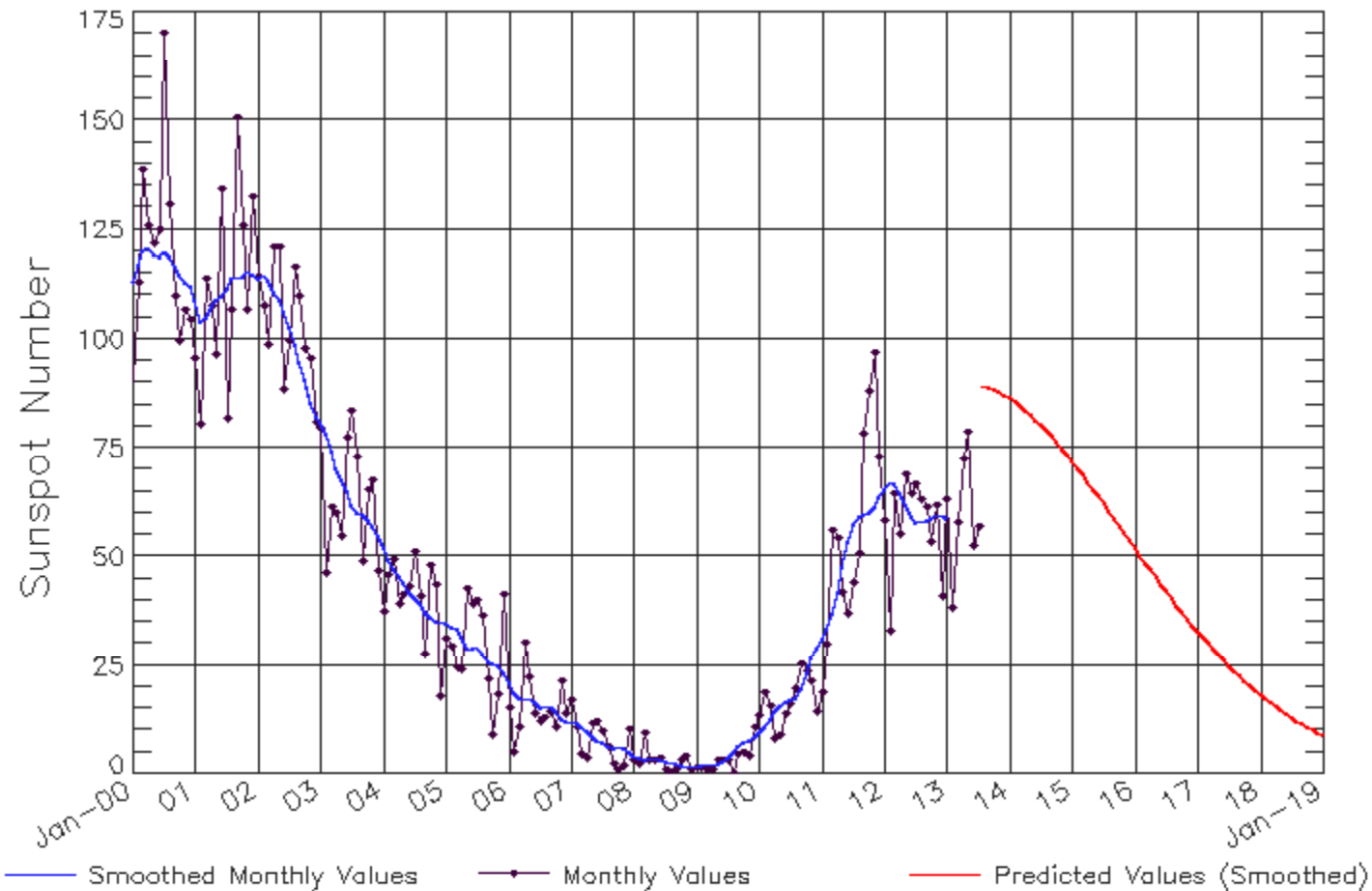
Overview

1. What is a Geomagnetic Disturbance (GMD)
2. What are the concerns
3. What is being done to better understand effects and impacts
4. How to manage adverse impacts
5. What study and operational management tools are available and on the horizon
6. Technical limitations for where we are today

Solar Cycle 24 - The probability of GMD's



ISES Solar Cycle Sunspot Number Progression
Observed data through Jul 2013

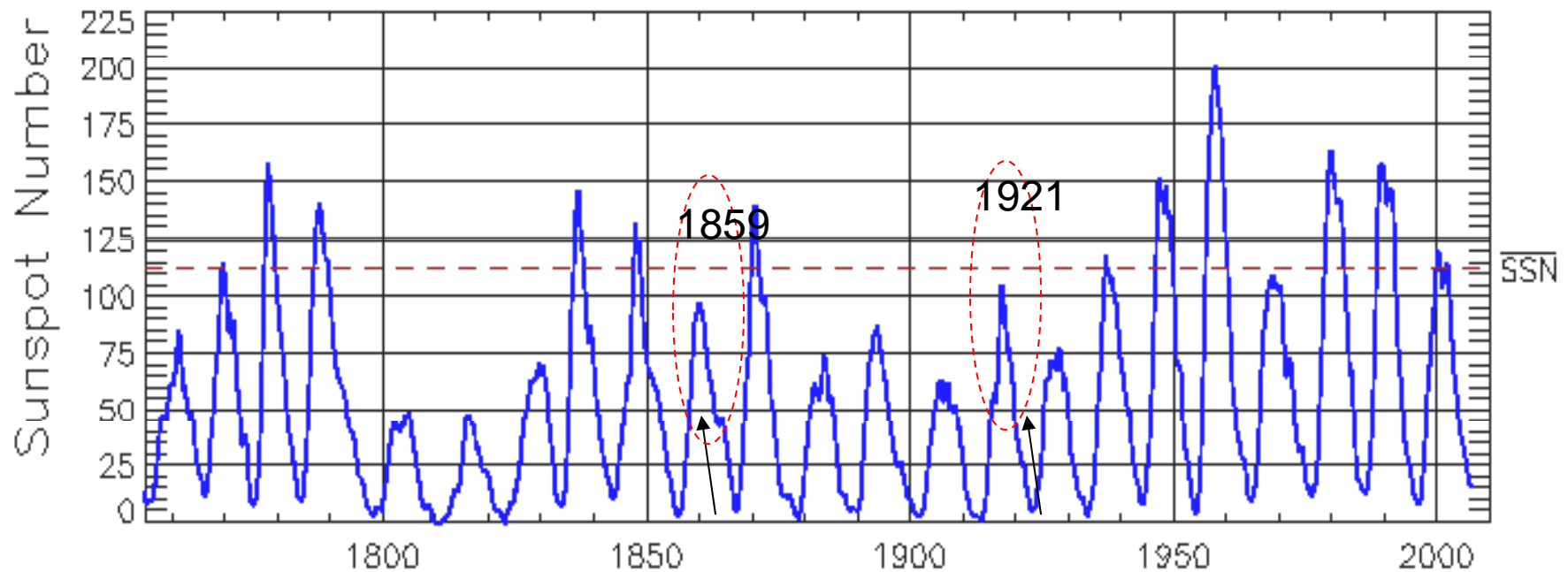


Updated 2013 Aug 5

NOAA/SWPC Boulder, CO USA

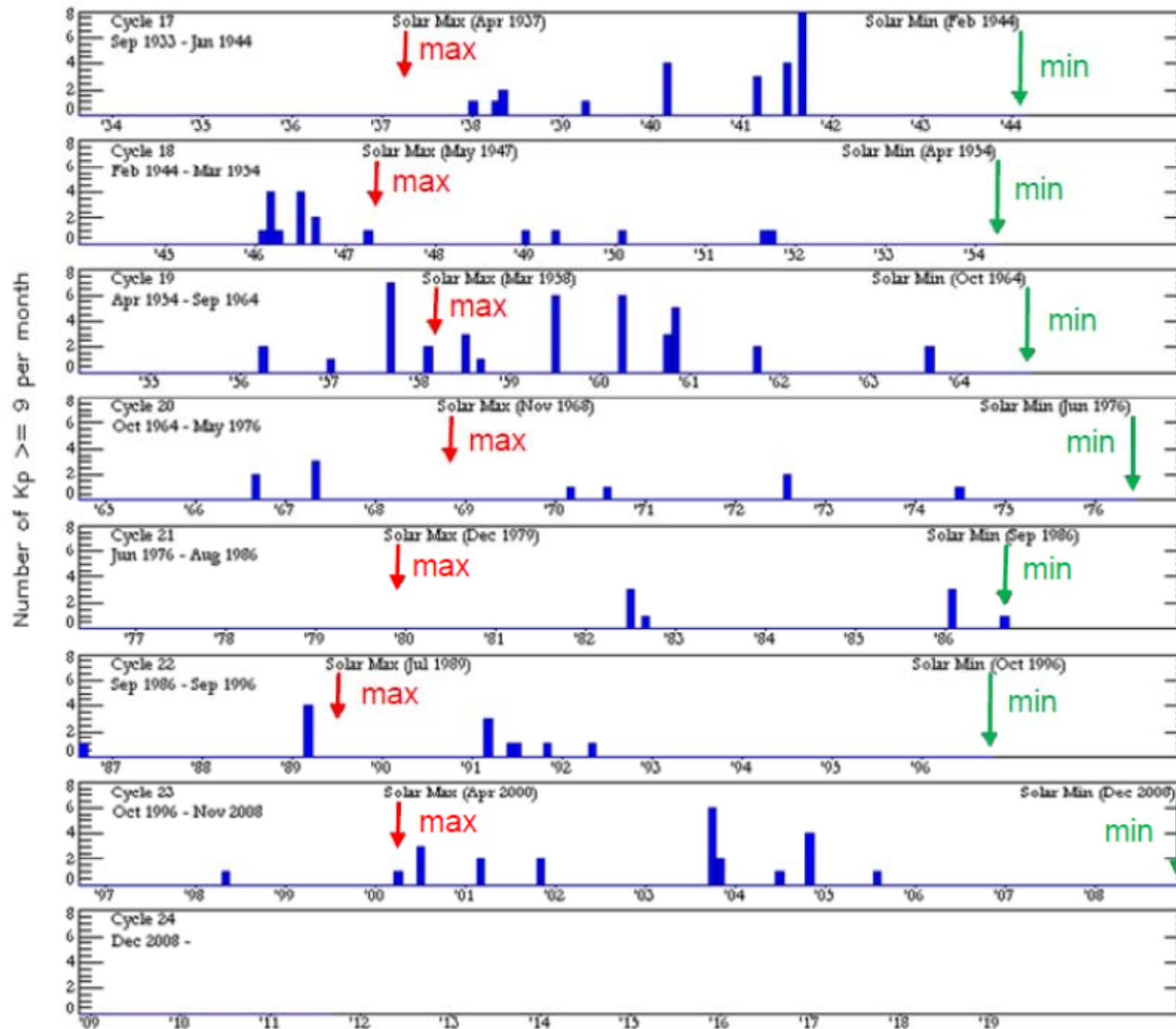


The Solar Cycle in Sunspot Number



- While the probability differs, a Coronal Mass Ejection and subsequent Geomagnetic Disturbance can theoretically occur at any time.
- We have a clear history of a number of Severe GMD and they do impact electric Power grids (1859, 1921, 1992, 1989, 2003, etc.)

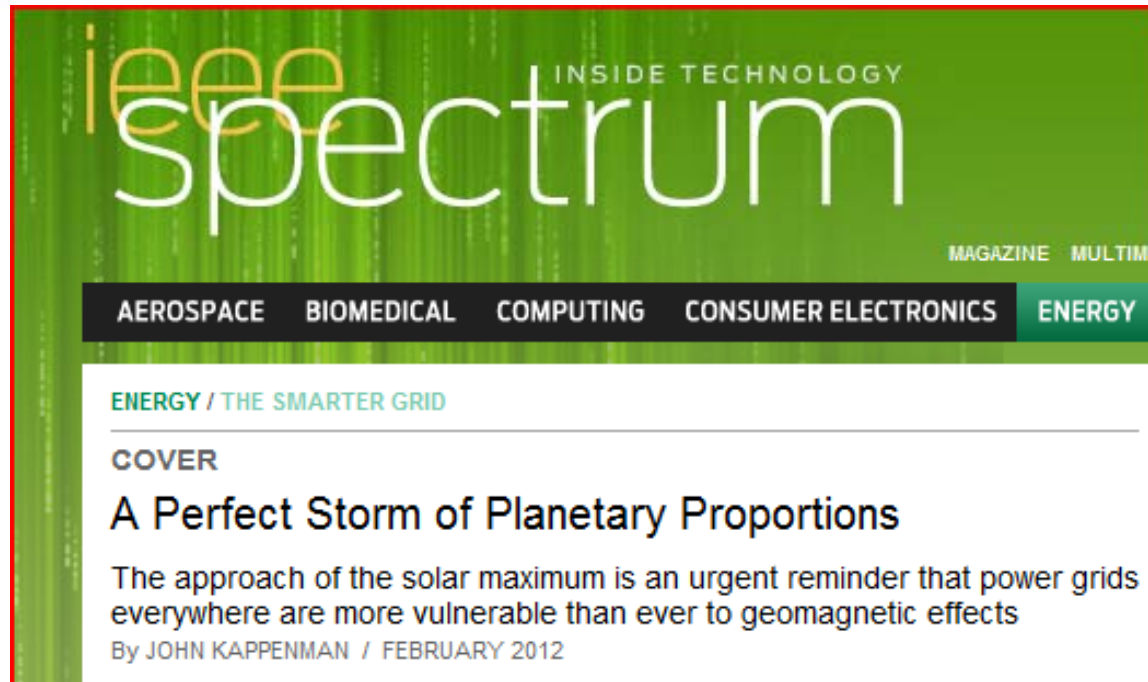
Uncertainty in Prediction



Worst Case Storms Do Not Generally Occur at the Solar Maximum (number of sunspots).

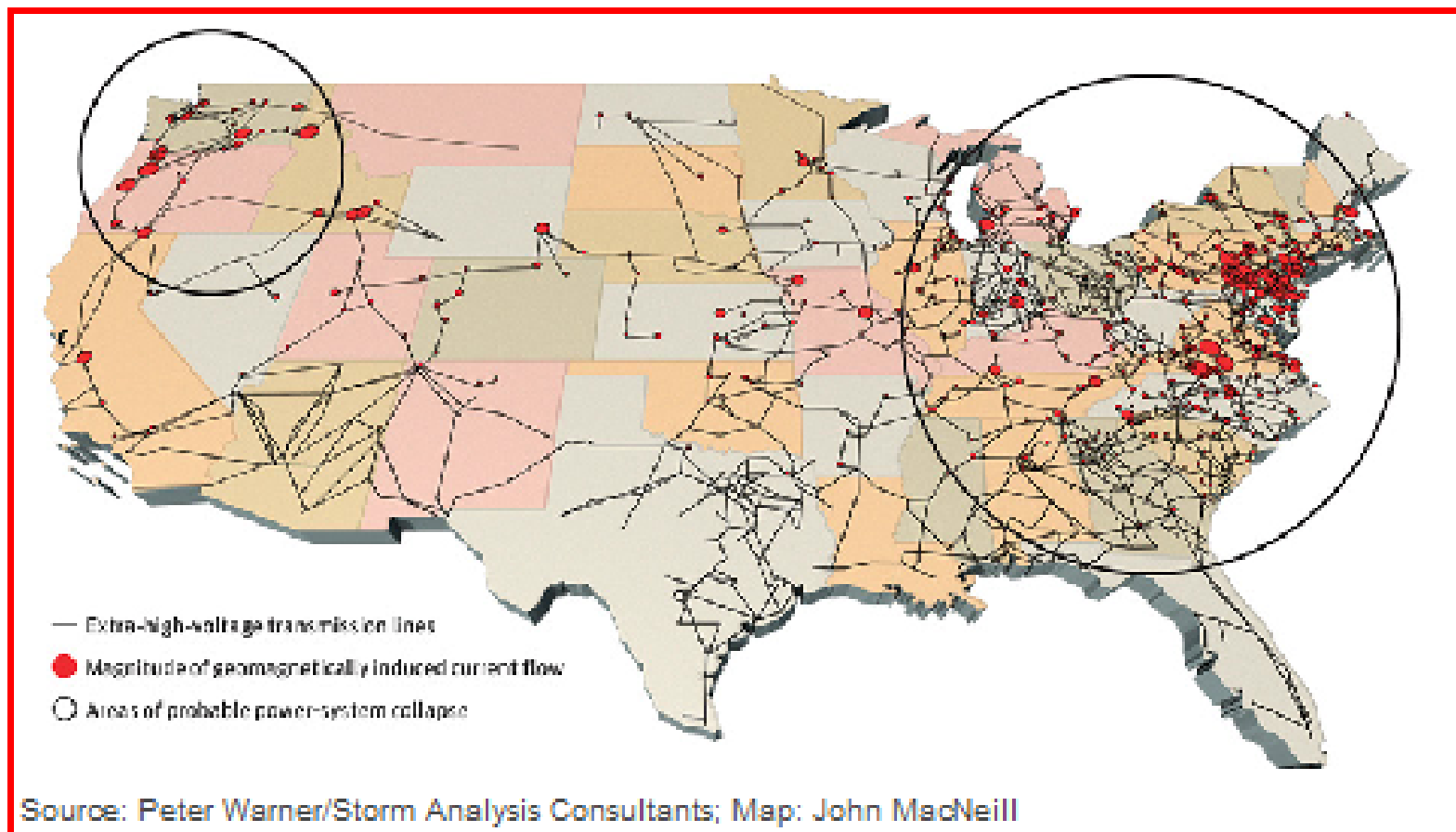
Source: NOAA Space Weather Prediction Center

Doomsday GMD Scenario



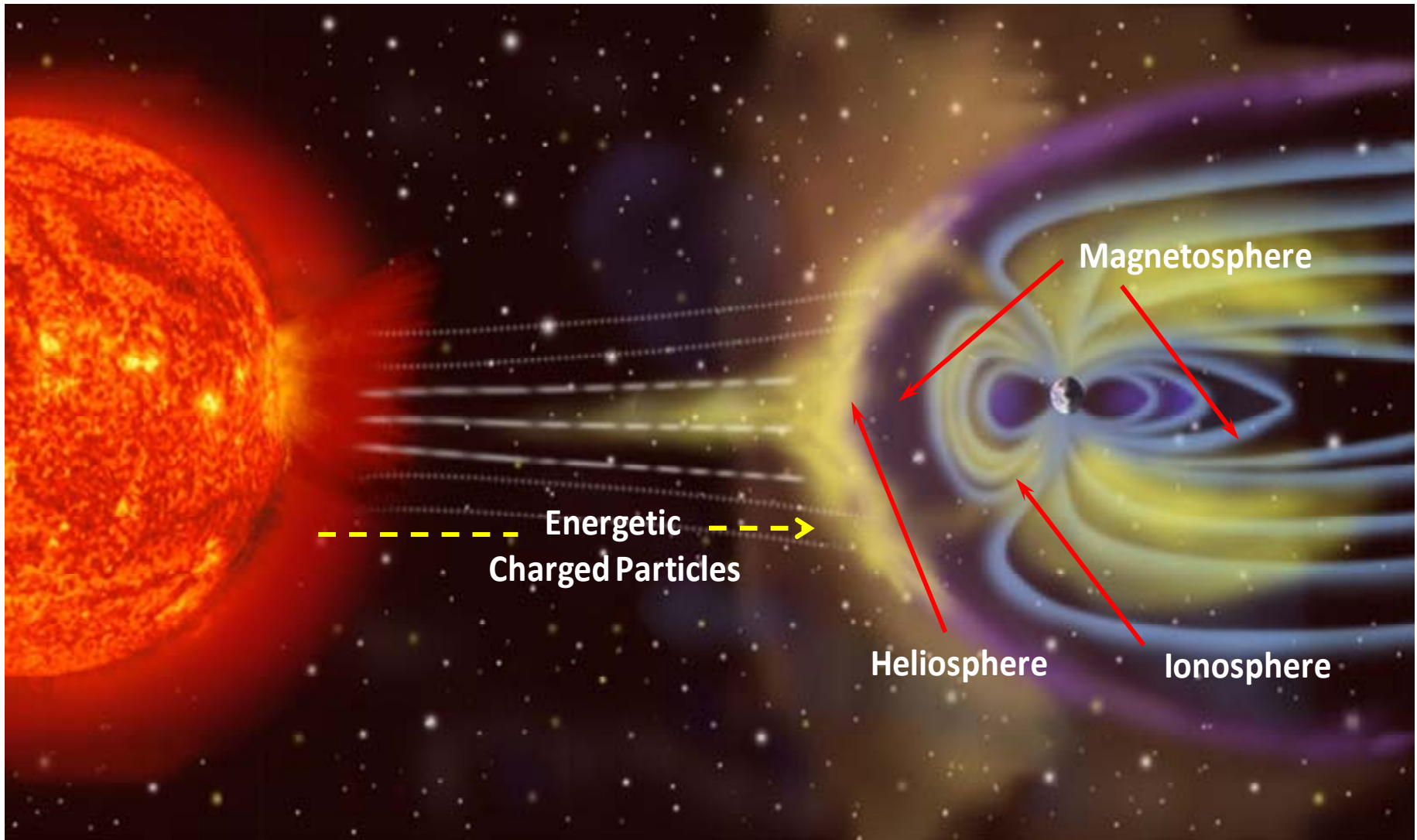
“Linked to the celestial spectacle are enormous fluctuations of the magnetic field in Earth's magnetosphere, which are causing immense flows of electric current in the upper atmosphere over much of the planet. Those huge currents disturb Earth's normally quiescent magnetic field, which in turn induces surges of current in electrical, telecommunications, and other networks across entire continents. Streetlights flicker out; electricity is lost. A massive planetary blackout has occurred, leaving vast swaths of North and South America, Europe, Australia, and Asia without power.

Within a few months, the crisis has deepened. In many areas, food shortages are rampant, drinking water has become a precious commodity, and patients in need of blood transfusions, insulin, or critical prescription drugs die waiting. Normal commerce has ground to a halt, replaced by black markets and violent crime. As fatalities climb into the millions, the fabric of society starts to unravel.”

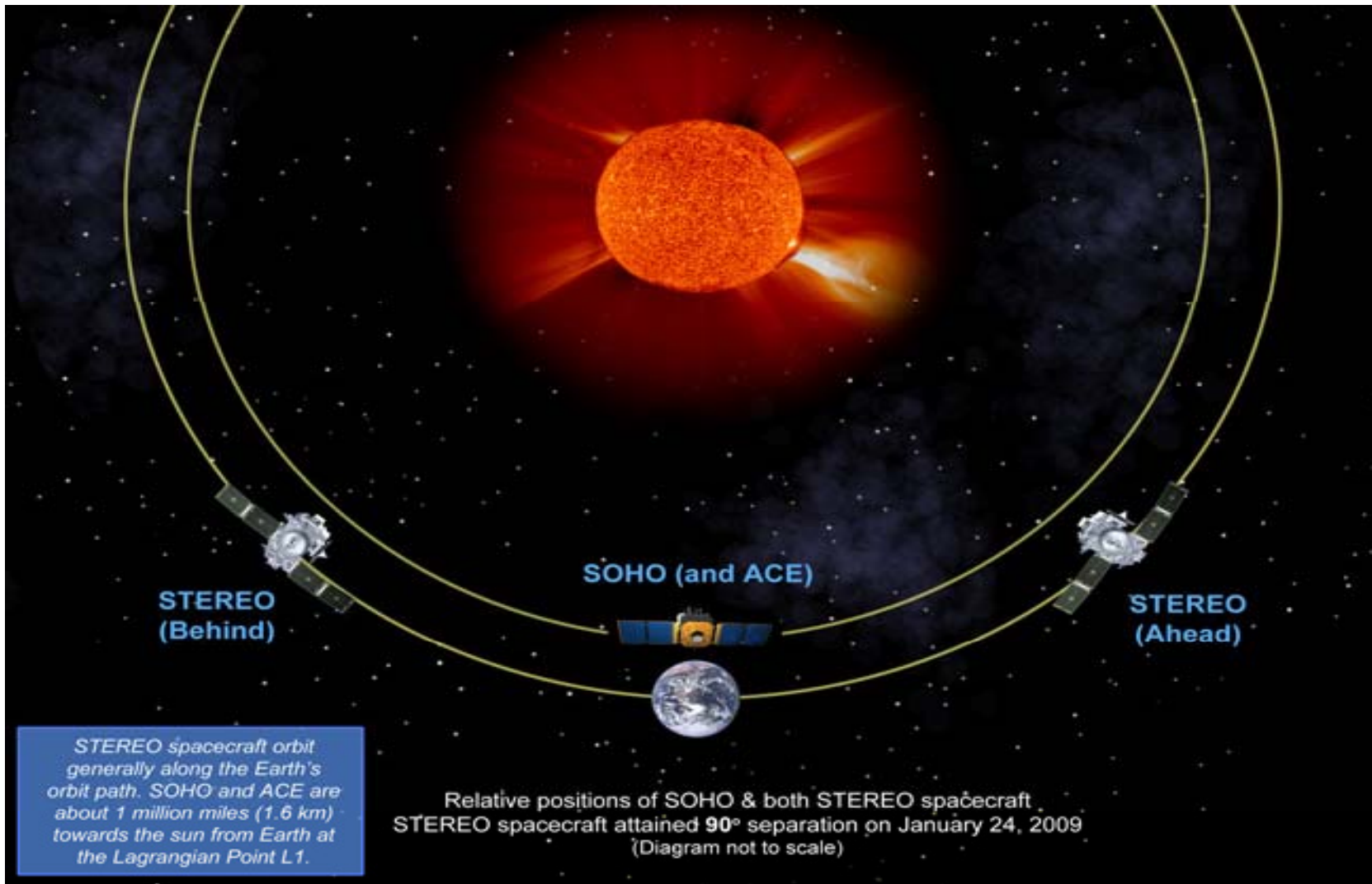


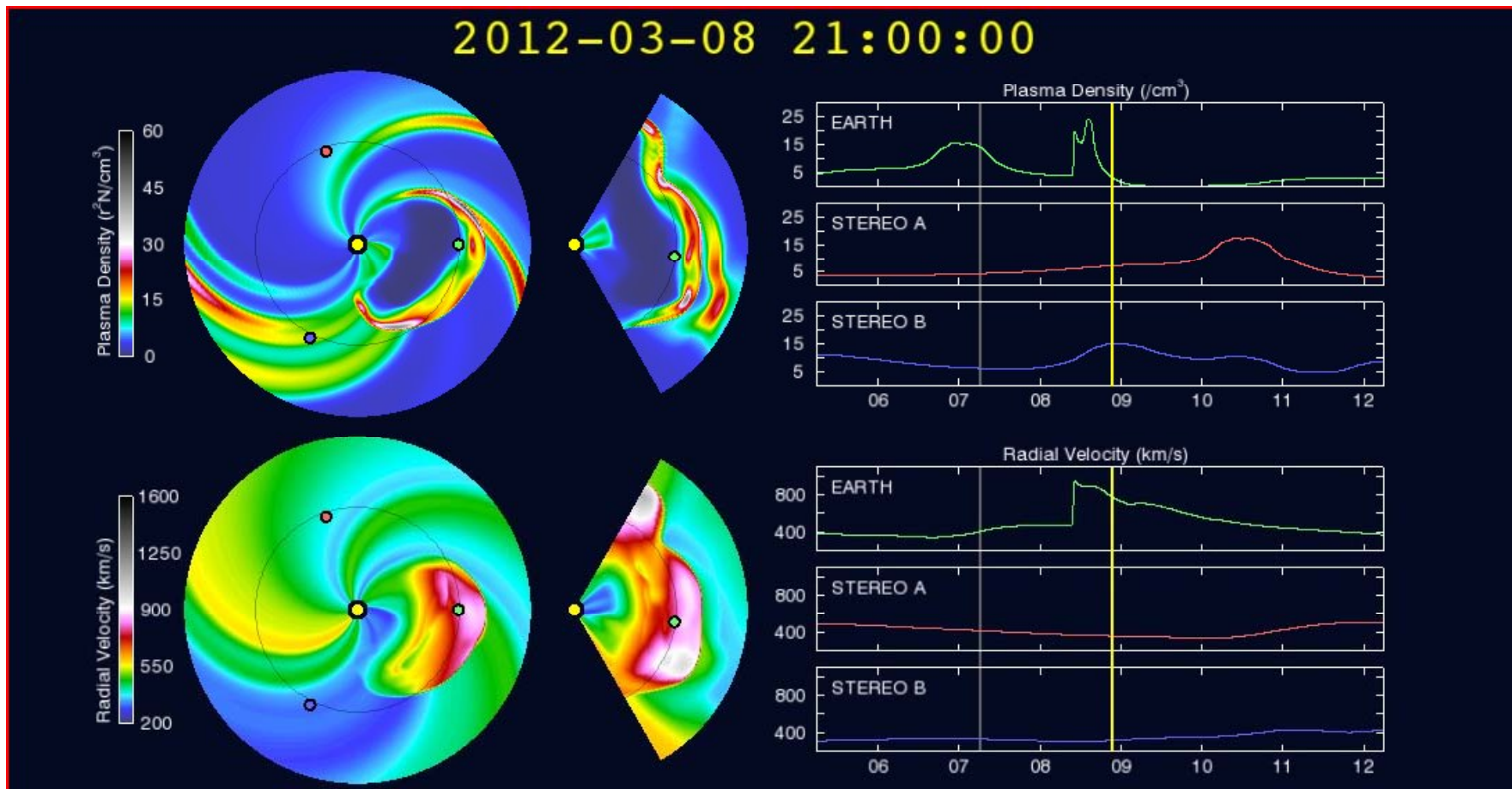
According to the scenario..

- Based on a projected 5,000 nT/min storm, a large numbers of EHV transformers will **fail**
- Since transformers are custom-built and not sourced domestically (This is changing), recovery could take years



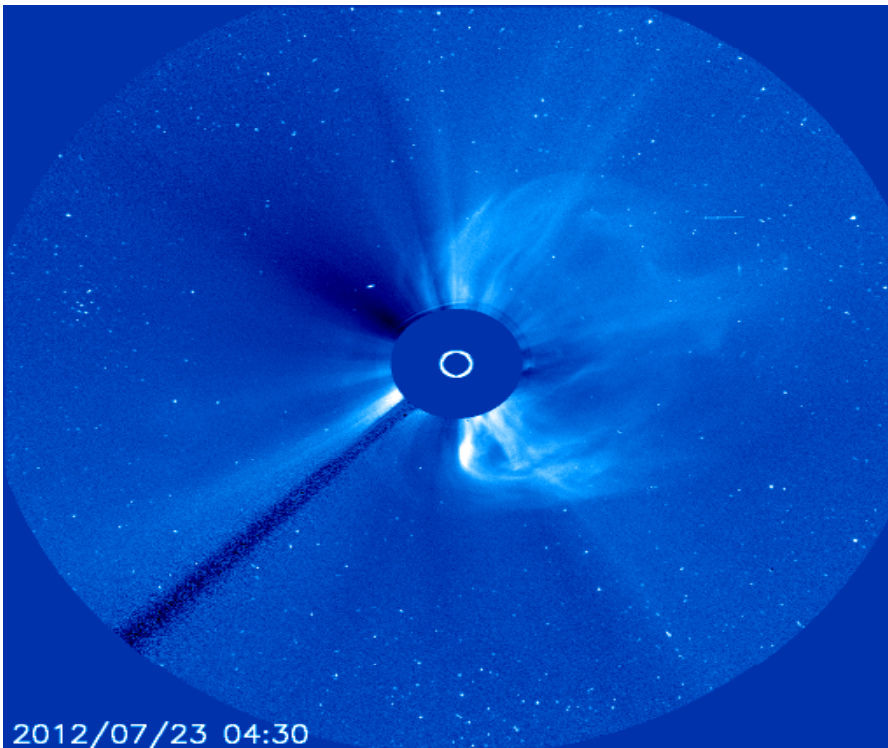
GMD Detection





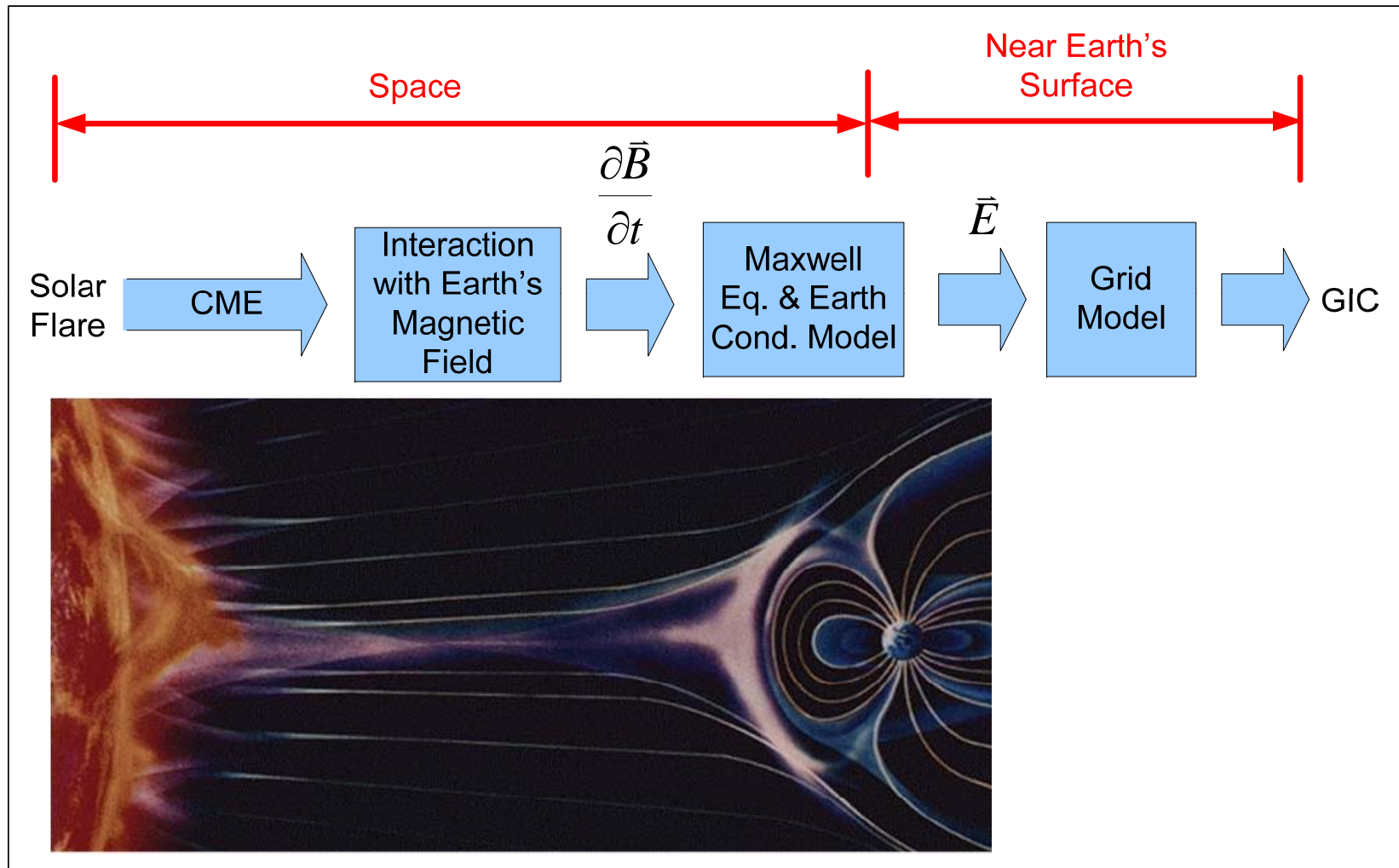
Source: WSA-Enil Solar Wind Tool

A Recent "Near Miss"

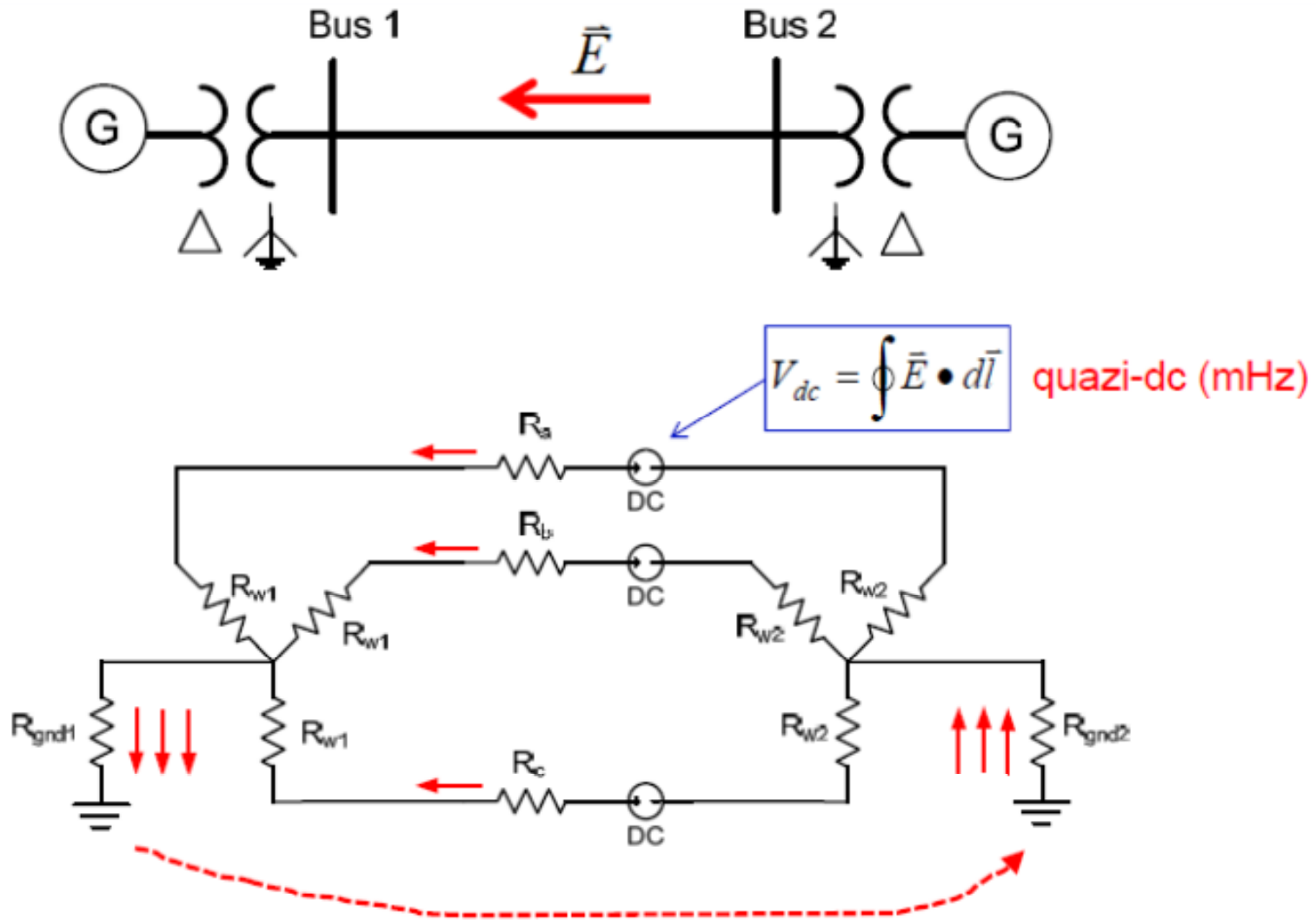


On July 23rd 2012, a powerful event occurred on the sun. The eruption however, was on the far side of the sun; consequently, we are not expecting any geomagnetic activity. It is likely that if this event had occurred ~ 10 days earlier when the sunspot cluster was facing Earth, we would have initiated the NERC/RC telecon for a likely extreme geomagnetic storm. The flare was huge and the CME was very fast. The CME impacted the STEREO spacecraft ~ 19 - 20 hours after the eruption on the sun. That would put it in the Carrington 1859 (17.6 hrs), Halloween 2003

The Physics: Geomagnetic Disturbances



Induced GIC Flow from Electric Field



What are the risks to operation of the bulk power system from a strong GMD?



- The most significant issue for system operators to overcome a severe GMD event is to maintain **voltage stability**.
- As transformers absorb high levels of reactive power, protection and control systems may trip supporting reactive equipment due to the harmonic distortion of waveforms.
- In addition, maintaining the health of operating bulk power system assets during a geomagnetic storm is a key consideration for asset managers.
- There is also the indication that GIC could lead to failure of Transformer Banks in unusual circumstances.

What transformers are at risk from a GMD?



- The magnitude, frequency, and duration of GIC, as well as the geology and transformer design are key considerations in determining the amount of heating that develops in the windings and structural parts of a transformer.
- The effect of this heating on the condition, performance, and insulation life of the transformer is also a function of a transformer's design and operational loading during a GMD event.



- Some older transformer designs are more at risk for experiencing increased heating and VAR consumption than newer designs.
- Additionally, transformers that have high water content and high dissolved gasses and those nearing their dielectric end-of-life may also have a risk of failure.

GIC Impacts on Transformer Reactive

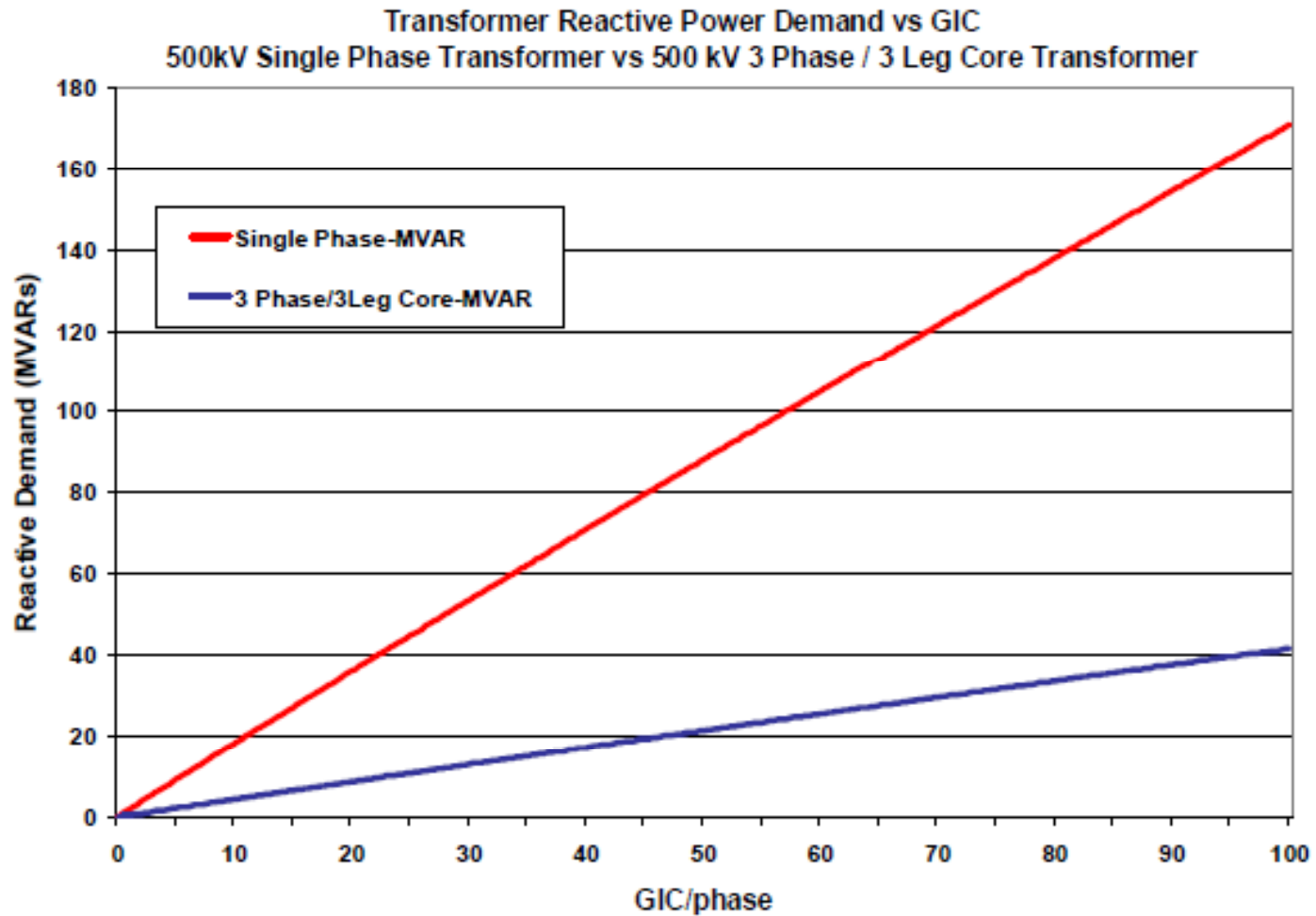
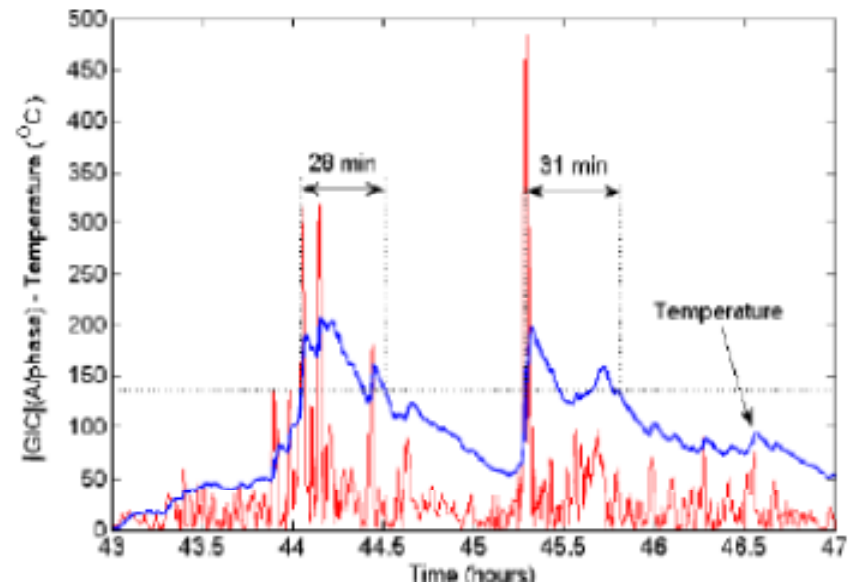
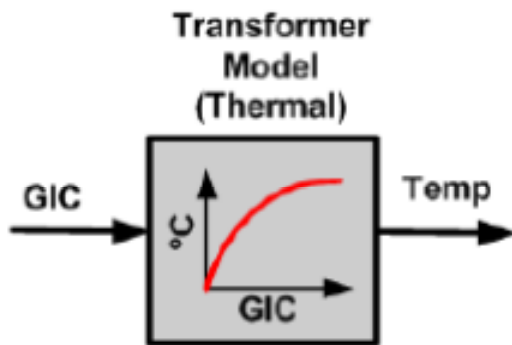


Figure 1-17. Transformer MVAR increase versus GIC for 500kV single-phase and 3-phase, 3-legged core form.

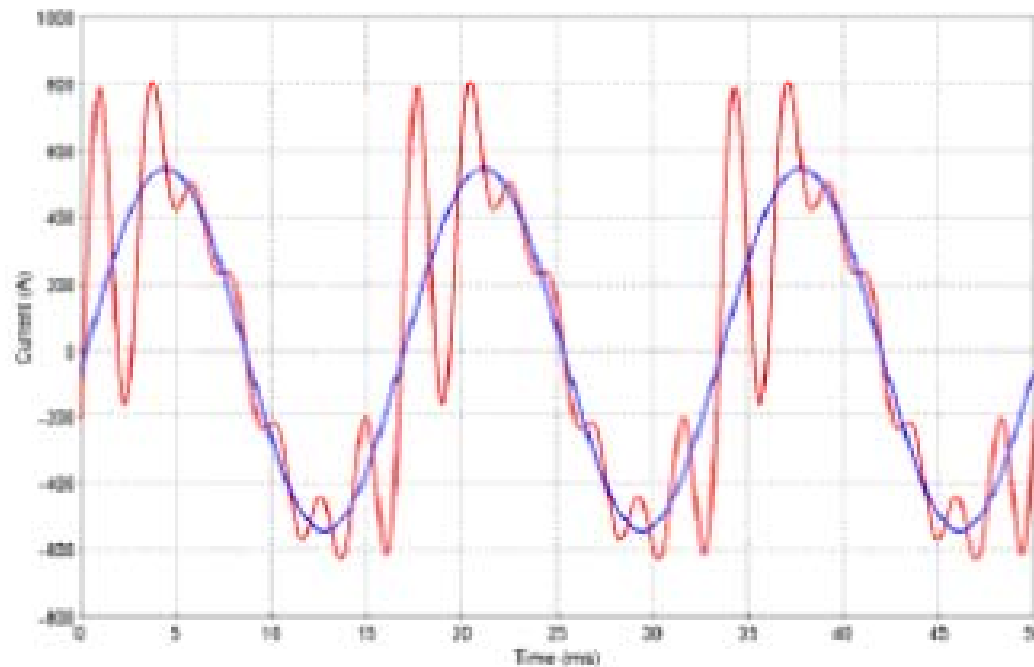


- Thermal models are needed to know if a transformer is operating beyond thermal capability, and work is underway to develop





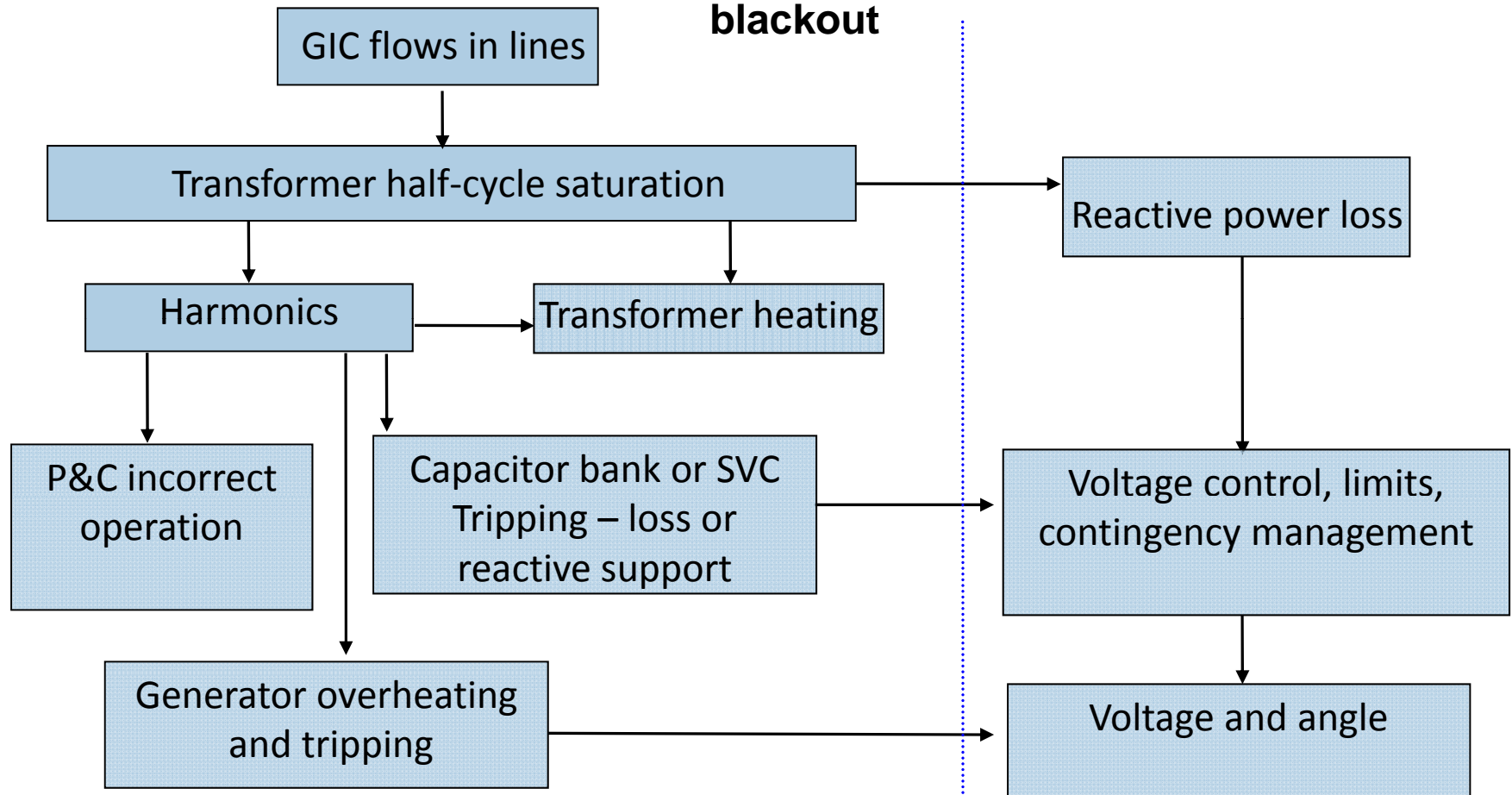
- Transformers become significant sources of harmonic current during GMDs
- Shunt Capacitors and Filters can become overloaded
- Protection Systems can be vulnerable to harmonic distortion



Effects of GIC in HV Network



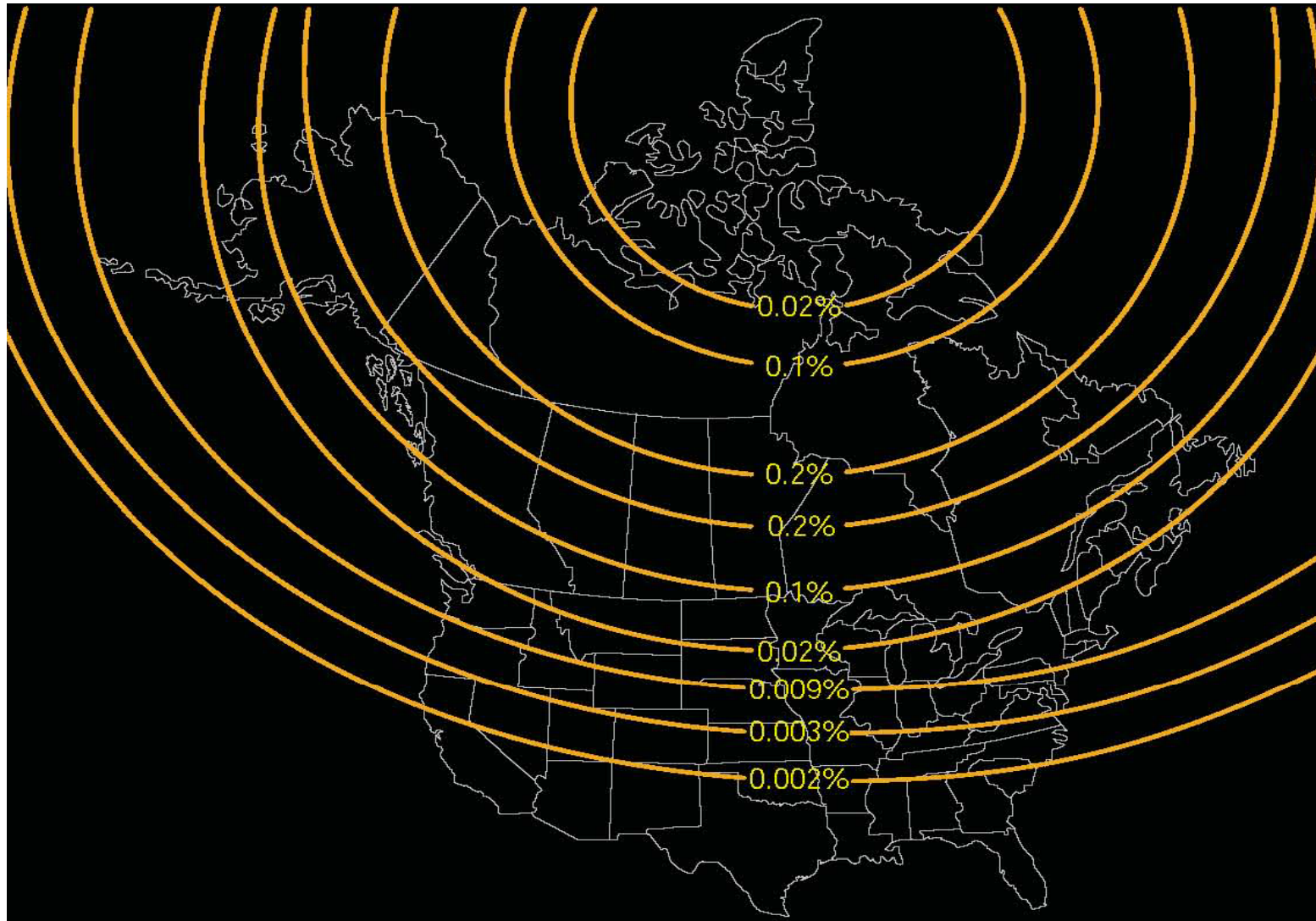
**Can lead to voltage collapse and
blackout**



GIC simulations

Power system simulations

GMD Probability >300nT/min





Major Conclusion

- Most likely result from a severe GMD is the need to **maintain voltage stability**

Major Conclusion

- System operators and planners need tools to **maintain reactive power supply**

Major Conclusion

- Some transformers may be damaged or lose remaining life, depending on design and current health



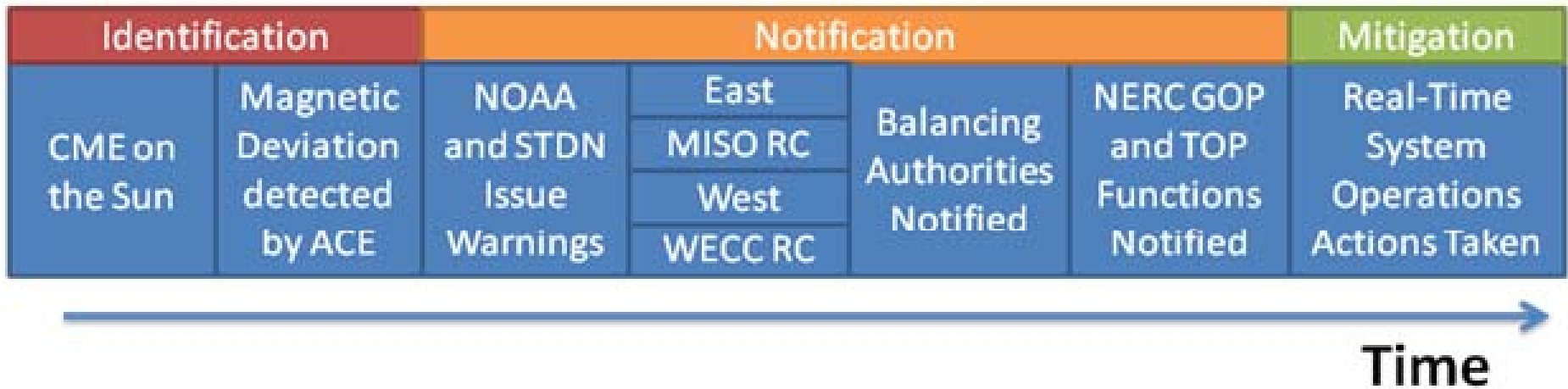
Local

Solar Activity	A Index Level	K Index Level
Quiet	A Index <7,	Usually no K-indices >2
Unsettled	7 < A Index < 15,	Usually no K-indices > 3
Active	15 < A Index < 30,	A few K-indices of 4
Minor Geomagnetic Storm	30 < A Index < 50,	K-indices mostly 4 and 5
Major Geomagnetic Storm	50 < A Index <100	K-indices mostly 5 and 6
Severe Geomagnetic Storm	A Index>100	K-indices 7 or greater

Global

Kp Index	NOAA Space Weather Scale Geomagnetic Storm Levels
Kp=5	G1 (Minor)
Kp=6	G2 (Moderate)
Kp=7	G3 (Strong)
Kp=8	G4 (Severe)
Kp=9	G5 (Extreme)

What Happens in case of a GMD?



IRO-005-3.1a R3. Each **Reliability Coordinator** shall ensure its Transmission Operators and Balancing Authorities are aware of Geo-Magnetic Disturbance (GMD) forecast information and assist as needed in the development of any required response plans. This will typically happen at a K7 index level.

FERC issued order 779 in May 2013 directing NERC to develop reliability standards to address the potential impact of geomagnetic disturbances (GMDs) on the reliability operation of the Bulk-Power System.

As directed in order 779, developed in two stages

Stage 1 standard(s) will require applicable registered entities to develop and implement Operating Procedures that can mitigate the effects of GMD events.

EOP-010-1 - Geomagnetic Disturbance Operations
Stage 1 standards must be filed by January 2014.

Stage 2 standard(s) will require applicable registered entities to conduct initial and on-going assessments of the potential impact of benchmark GMD events on their respective system as directed in order 779.

Stage 2 standards must be filed by January 2015.



Actions to be considered :

1. Increase import capability:

- Discontinue non-critical maintenance work and restore out-of-service transmission lines, wherever possible.
- Evaluate postponing/rescheduling planned outage and maintenance activities. Avoid taking transmission lines out of service unless reliability affects of the line outage has been evaluated.

2. The Reliability Coordinator may instruct Generator Operators to increase real and reactive reserves to preserve system integrity during a strong GMD event by performing such actions as: Reducing generator loading



3. Transmission Operators and Generator Operators should increase situational awareness and enhance surveillance procedures. Reliability Coordinators should be informed of all actions such as:

- Unusual voltage and/or MVAR variations and unusual temperature rise are detected on transformers and GSU's.
- Abnormal noise and increased dissolved gas on transformers, where monitoring capability exists.
- Trips by protection or unusual faults that are detected in shunt capacitor banks and static VAR compensators.



1. Increase reactive reserves and decrease loading on susceptible equipment and coordinate the following actions with the Reliability Coordinator such as:

- Bring equipment online to provide additional reactive power reserves.
- Increase dynamic reactive reserves by adjustment of voltage schedules or other methods.
- Reduce power transfers to increase available transfer capability and system reactive power reserves.
- Decrease loading on susceptible transformers through reconfiguration of transmission and re-dispatching of generation.



2. Increase attention to situation awareness and coordinate information and actions with Reliability Coordinator such as:

- Reduce power output at susceptible generator stations if erratic reactive power output from generators or excess reactive power consumption by generator step-up transformers is detected.
- Remove transmission equipment from service if excessive GIC is measured or unusual equipment behavior is experienced and the system affects of the equipment outage has been evaluated.



- Assure we have appropriate procedures
- Estimate vulnerability of system equipment and protection schemes to GIC. (Model and simulate).
- Increase visibility of GIC on the system (Real time measurement)
- Assure we have system equipment and protection schemes to mitigate vulnerability



Operating procedures/practices

- Revising operational procedures as we obtain new information out of the NERC Task Force effort
- GIC current measurement displayed on dispatch screen for monitored transformers
- Adding GIC flow alert to signal Dispatch that GIC conditions exist as part of voltage control management (20A greater than 20 seconds)



Transformer Monitoring

- BPA is replacing our first vintage neutral current monitors with measurement that also includes:
 - **DC amps**
 - **VARS**
 - **Harmonics**
 - **Tank wall vibration**

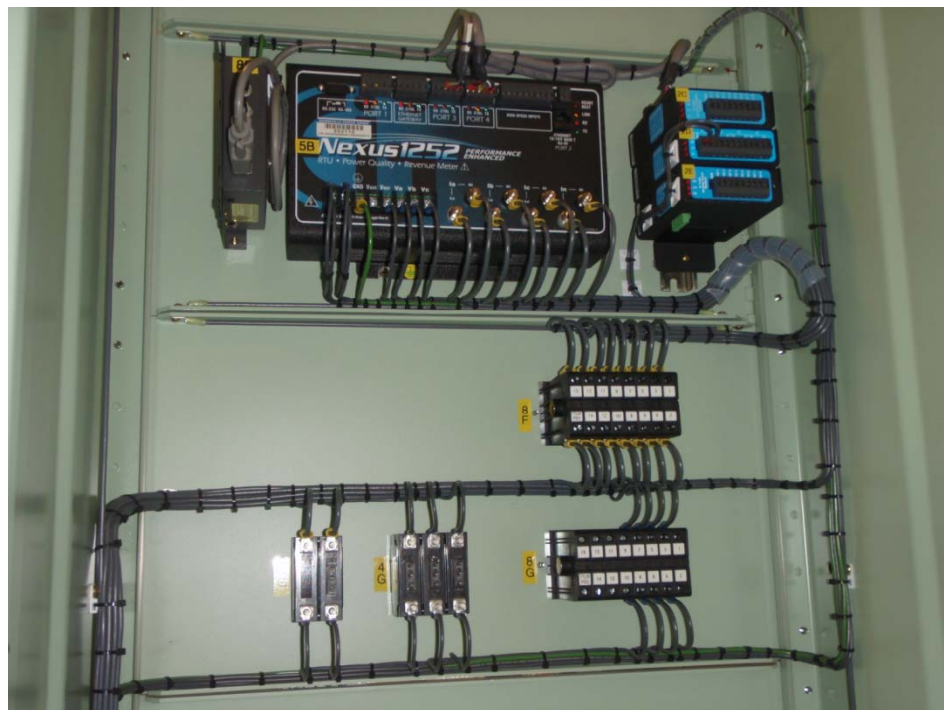


New GIC monitor





New GIC monitor





SCADA – Autotransformer Neutral Amps DC

07:44:22
17-Sep-2013

Geomagnetically Induced Current (GIC)

<u>STATION</u>	<u>INDUCED CURRENT</u>
ALVEY	0.80 AMP
BELL	-0.50 AMP
BIG_EDDY	5.40 AMP
HATWAI	0.10 AMP
HOT_SPRG	8.30 AMP
KEELER	64.20 AMP
MONROE	0.50 AMP
PEARL	0.00 AMP
ROSS	6.10 AMP
SACAJWEA	0.60 AMP
SICKLER	-0.10 AMP
TILLAMOK	0.00 AMP
VANTAGE	1.60 AMP 1.00 AMP



GIC Modeling and Studies

- Contracted a GIC study through a commercial software vendor 115 kV to 500 kV
- This partnership has helped obtain resistive modeling data from neighboring utilities
- First VAR demand sensitivity study of grid completed September 2013



Transformer/Substation Parameter

Utility	Transformer Parameters	Substation Parameters
BPA	Yes	Yes
PacifiCorp	Yes	No
Idaho Power Company	Yes	Yes
US Army Corps of Engineers	Yes	No
Puget Sound Energy	Yes	Yes
Avista Corporation	Yes	Yes
Portland General Electric	Yes	No
US Bureau of Reclamation	No	No
Grant PUD	No	No
Chelan PUD	Yes	No
Seattle City Light	Yes	Yes
Tacoma Power	Yes	No
Iberdrola Renewables	No	No
Eugene Water and Electric Board	Yes	No
Douglas PUD	Yes	Yes
Cowlitz PUD	Yes	No
Snohomish PUD	Yes	Yes
Clark PUD	Yes	No

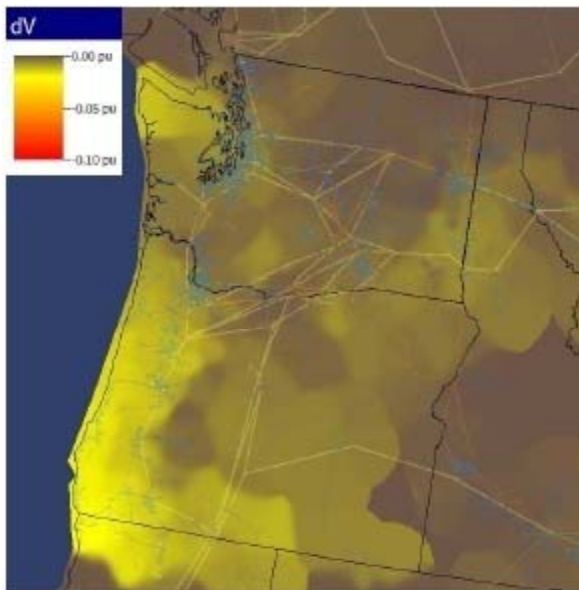
There are 842 transformers in the study footprint with primary voltages of 115kV and above

Parameter	Number of Units
Grounding Configuration	545 (65%)
Coil Resistance	249 (30%)
Is an Autotransformer?	557 (66%)
Core Type	289 (34%)

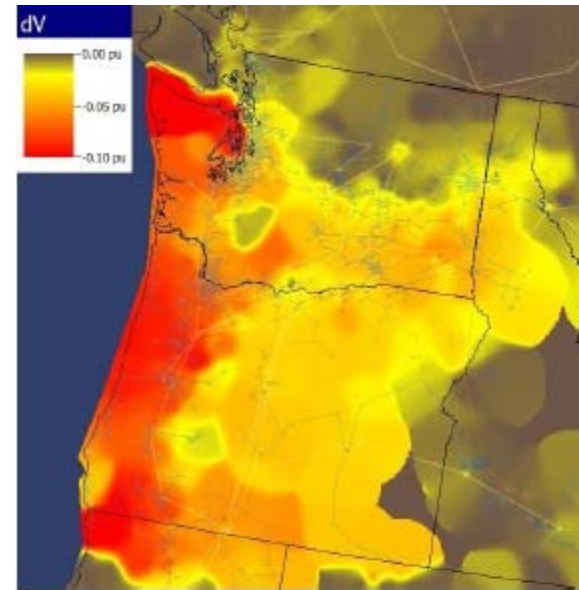


Uniform Field Modeling Results

1V/km, 75 degree orientation			
	Including 115kV	excluding 115kV	difference
GIC 3 phase Transformer MVAR Losses	1335	1265	70 or 5.24%



(a) 1 V/km

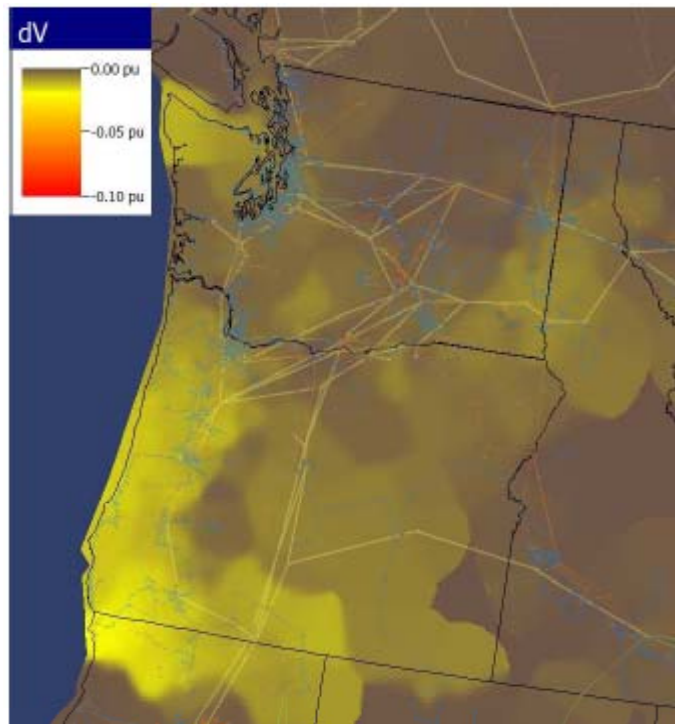


(d) 3.85 V/km - last valid solution

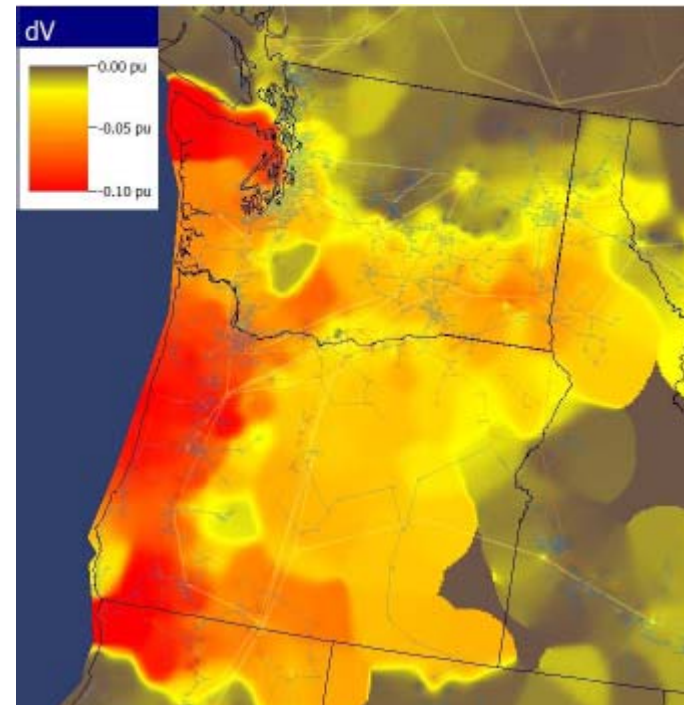


Uniform Field Modeling Results

- Apply Neutral Blocking



(a) 1 V/km



(d) 4.6 V/km - last valid solution

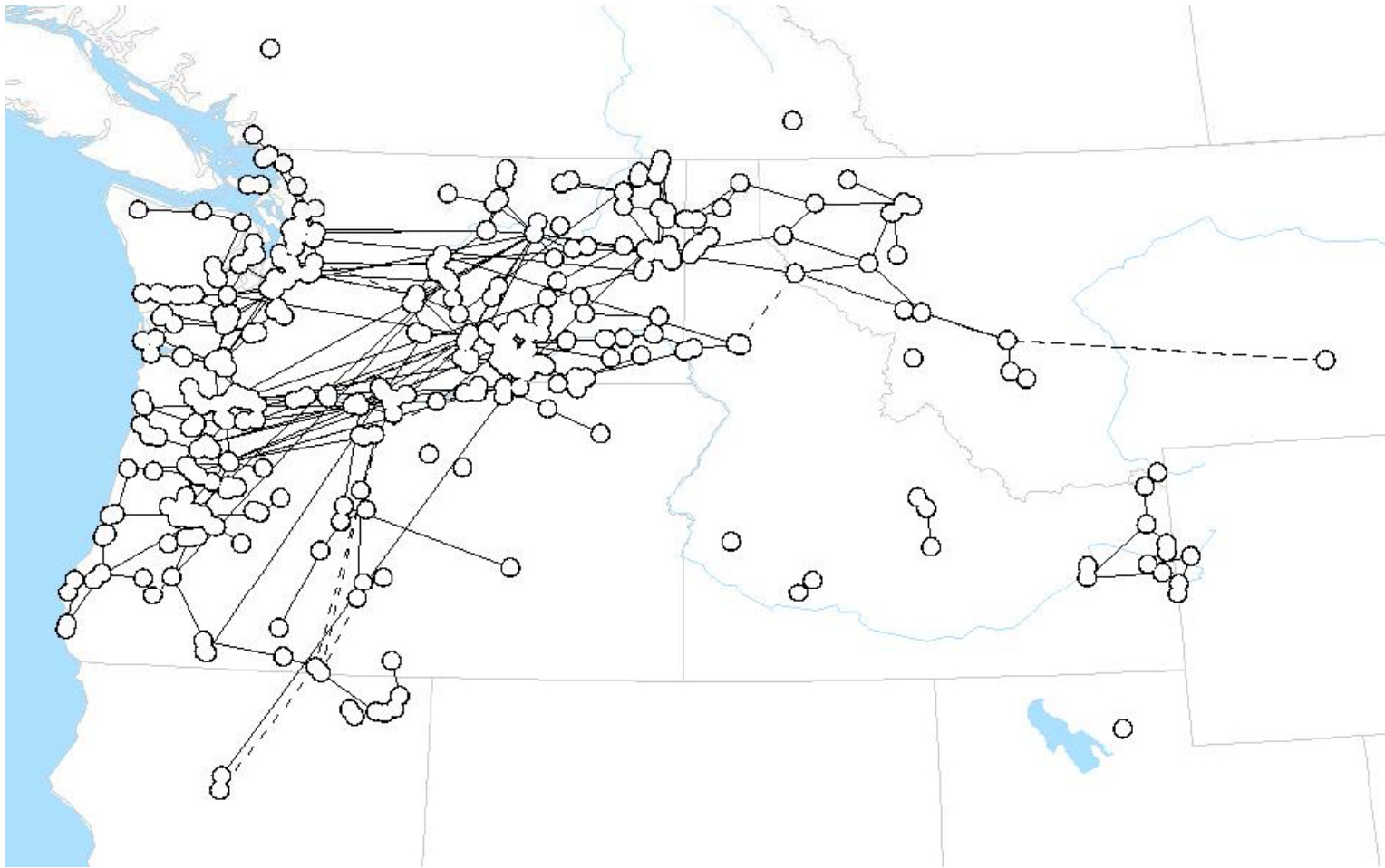


Real time Simulators

- Working on modeling with NRCan simulator to compare performance against GIC monitor data
- Looking to use study models and simulators to perform sensitivity studies to determine locations of high GIC flow to pre-inform system operators of potential trouble
- Industry needs a real time tool in addition to pre-worked scenario studies of the network



NRCan GIC Simulator – BPA model





Still needed

- Need NERC GMD TF deliverables for transformer behavior curves to know decision points for transformers operating under GIC conditions:
(VAR, Harmonics, and Thermal stress)
- Cross validation of study tools and modeling techniques to verify reasonable and useable results are being obtained
- Better GIC handling specifications for new transformers



NERC GMD TF 2 Deliverables

- http://www.nerc.com/comm/PC/Geomagnetic%20Disturbance%20Task%20Force%20GMDTF%20DL/GMD_Phase_2_Project_Plan_APPROVED.pdf



Other Information Sources

- [http://www.nerc.com/comm/PC/Pages/Geomagnetic-Disturbance-Task-Force-\(GMDTF\)-2013.aspx](http://www.nerc.com/comm/PC/Pages/Geomagnetic-Disturbance-Task-Force-(GMDTF)-2013.aspx)
- <http://www.geomag.nrcan.gc.ca/lab/default-eng.php>
- <http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=0000000000001026425>



- <http://www.nerc.com/files/2012GMD.pdf>
- [http://www.nerc.com/comm/PC/Pages/Geomagnetic%20Disturbance%20Task%20Force%20\(GMDTF\)/Geomagnetic-Disturbance-Task-Force-GMDTF.aspx](http://www.nerc.com/comm/PC/Pages/Geomagnetic%20Disturbance%20Task%20Force%20(GMDTF)/Geomagnetic-Disturbance-Task-Force-GMDTF.aspx)
- <http://www.nerc.com/pa/Stand/Pages/Project-2013-03-Geomagnetic-Disturbance-Mitigation.aspx>



ATFWG Report

NWPP Meeting

October 15 & 16, 2013

Portland, OR

Amy Lubick - NWMNT

After-The-Fact Tags

Why do we need ATF Tags and what are they used for?

ATF tags are used to allow Balancing Authorities (BAs), Transmission Service Providers (TSPs), and Scheduling Entities (SEs) to accurately reflect a schedule which was coordinated and controlled to by a BA's Energy Management Systems (EMS) and Automatic Generation Control (AGC) systems during real time system operations, but was not properly tagged.

After-The-Fact Tags

Common Reasons Used to Create ATF Tags:

- Missing or incorrectly used BA, TP, or SE
- Curtailment Issues
- Incorrect generator on tag
- Missing or incorrect Point of Receipt or Point of Delivery segment(s)
- Incorrect transmission path on tag versus what was purchased on the TSR (Transmission Service Reservation)
- Correction of losses

After-The-Fact Tags

More on ATF Tags:

- Can be created up to 168 hours (one week) after the start time and are processed per NAESB e-Tag Specifications.
- Prior to submitting - all involved parties need to **agree** upon the requested changes.
 - *Changes can only be made to correct the tag to properly reflect the coordinated and controlled to system operations at the time.*
- Lead entity shall **coordinate** with all parties involved to make sure all agree to the start time, stop time, MWhs, integrated values if necessary, reservation numbers, etc.
- In the comment field, note that this is an ATF tag replacing an original tag.
 - For example, in naming the ATF tag, original tag name *ABC1234* would be replaced by ATF tag *ATF1234*.
- Once the ATF tag is submitted, all involved parties must be informed that the tag is ready for approval and the new tag number should be referenced.

After-The-Fact Tags

Common Process Flow for ATF Tags and/or WECC Schedule Request Form:

- Call and/or email all parties involved on the tag when an ATF tag is needed and gain agreement to proceed.
- Coordinate changes needed within the timeframe for processing/submitting the ATF tag.
- Route WECC Schedule Request Change Form to all parties for signatures.
- Submit the Schedule Change Request Form to WECC and copy all parties involved.
- After WECC responds that the changes have been completed, all parties should verify that the changes were made properly in the WECC Interchange Tool (WIT).
- Submit the ATF tag, inform all involved parties that the tag is out for approval and reference the new tag number.
- Each entity should update its in-house scheduling software to reflect the changes (adjust or zero MW on the original tag schedule) and if necessary verify that the resultant Net Schedule Interchange matches with WIT for that particular hour.

Tracking ATF Tags

- Continue to track ATF tags in 2013.
- As of mid August there were a total of 43 ATF tags and/or WIT changes.

2013 ATF Tag/WIT Changes	
REASON	COUNT
Curtailment error	4
Generation Adjustment	5
Incorrect Generator	2
Incorrect PATH	6
Incorrect PSE	5
Incorrect Sched Entity	3
incorrect source/sink	2
Incorrect tag adjusted	1
Integrated incorrectly	1
Sched Entity left off path	3
Scheduling error	5
System error	6



ATF Manual Guideline

- Subgroup established to review and revise document.

- Six (6) webinar meetings held in late 2012 - early 2013 (all posted & notifications sent).
- Revised document has been reviewed by WECC Technical Writer (April 2013).



ATF Manual Guideline

- Posted for 30 day comment period (6/28 – 7/28).
- Received comments from one party.
- Webinar meeting posted (9/19) and held last week (10/9) to respond to the comments received.
- Anticipate approval of document at January 2014 ISAS meeting.

Questions?



Amy Lubick

NorthWestern Energy

amy.lubick@northwestern.com

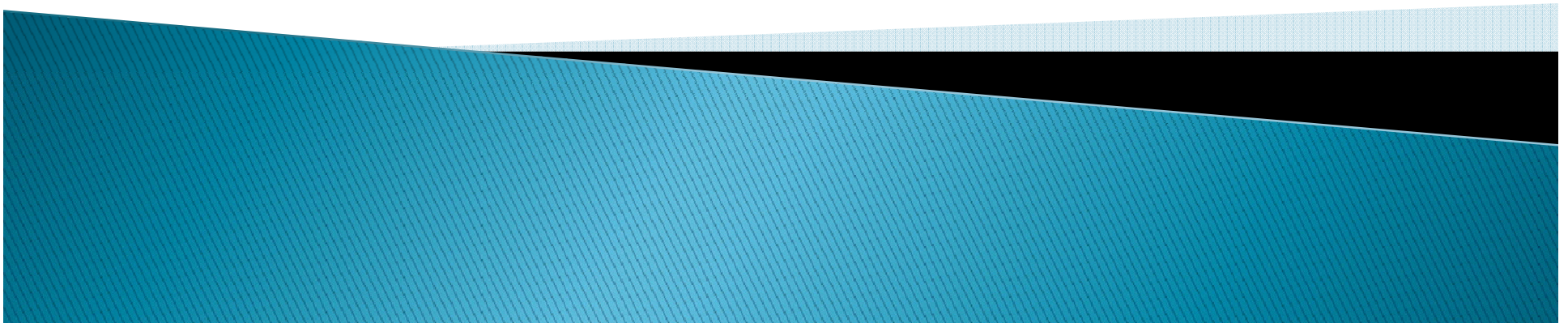
(406) 497-4517

**BPA TRANSMISSION'S REAL-TIME ALTERNATE
SCHEDULING CENTER (ASC)**

**BY LOU MIRANDA
BONNEVILLE POWER ADMINISTRATION
TRANSMISSION SERVICES**

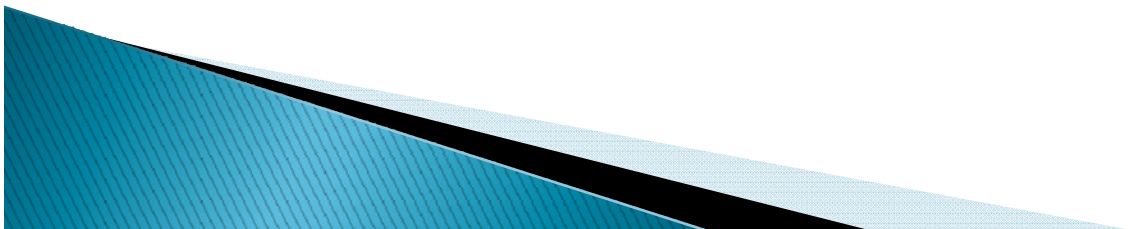
**NWPP SYSTEM SCHEDULERS MEETING
OCTOBER 15 -16, 2013**

**DOUBLETREE BY HILTON – LLOYD DISTRICT
1000 NE MULTNOMAH, PORTLAND, OR 97232**



PURPOSE OF ASC

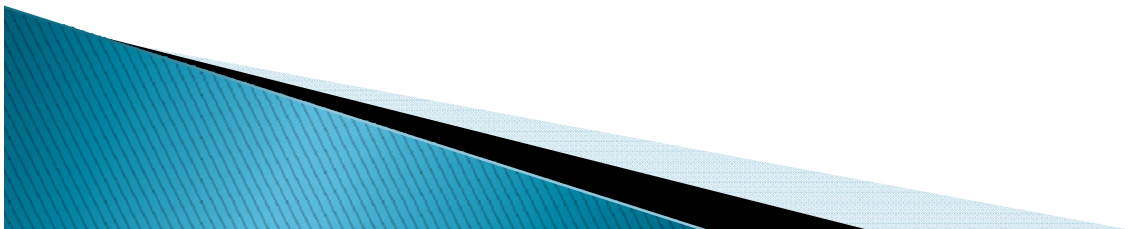
- ▶ PURPOSE OF THE ALTERNATE SCHEDULING CENTER IS TO PROVIDE CRITICAL BACKUP AND RECOVERY CAPABILITIES TO ENSURE BPA'S ABILITY TO MAINTAIN OPERATIONS IN CASE OF AN EARTHQUAKE OR OTHER EMERGENCY IMPACTING THE ENTIRE PORTLAND / VANCOUVER METRO AREA.
- ▶ BPA'S ALTERNATE SCHEDULING CENTER IS FORMALLY KNOWN AS THE MUNRO SCHEDULING CENTER (MSC).



REASONS FOR BUILDING THE MSC

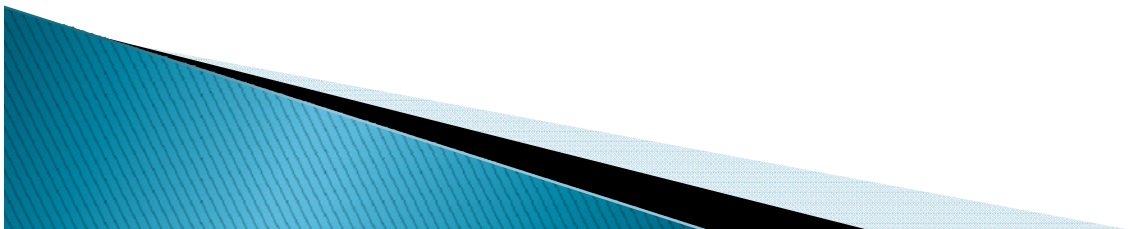
- ▶ REQUIRED BY FEDERAL CONTINUITY DIRECTIVES I & II ISSUED BY DEPT OF HOMELAND SECURITY

- ▶ DIRECTIVES REQUIRE FEDERAL AGENCIES TO MAINTAIN MISSION ESSENTIAL FUNCTIONS DURING PERIODS OF INTERRUPTION



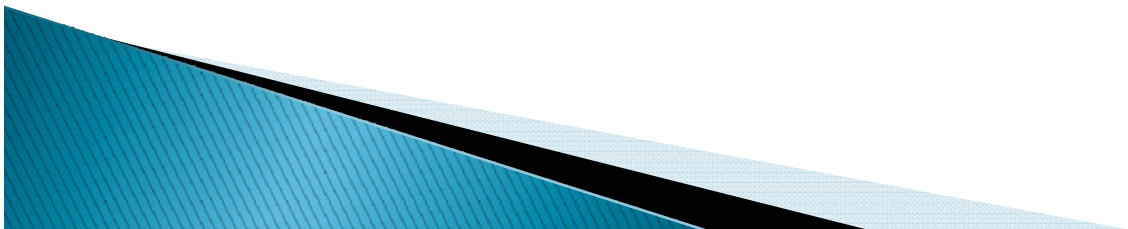
EXAMPLES OF INTERRUPTIONS

- ▶ NATURAL DISASTERS – (EARTHQUAKE, FLOODS, etc)
- ▶ PANDEMICS – DOES NOT THREATEN INFRASTRUCTURE, BUT DEGRADES HUMAN RESOURCES DUE TO ILLNESS, DEATH, etc
- ▶ TERRORIST ATTACKS
- ▶ WEAPONS OF MASS DESTRUCTION

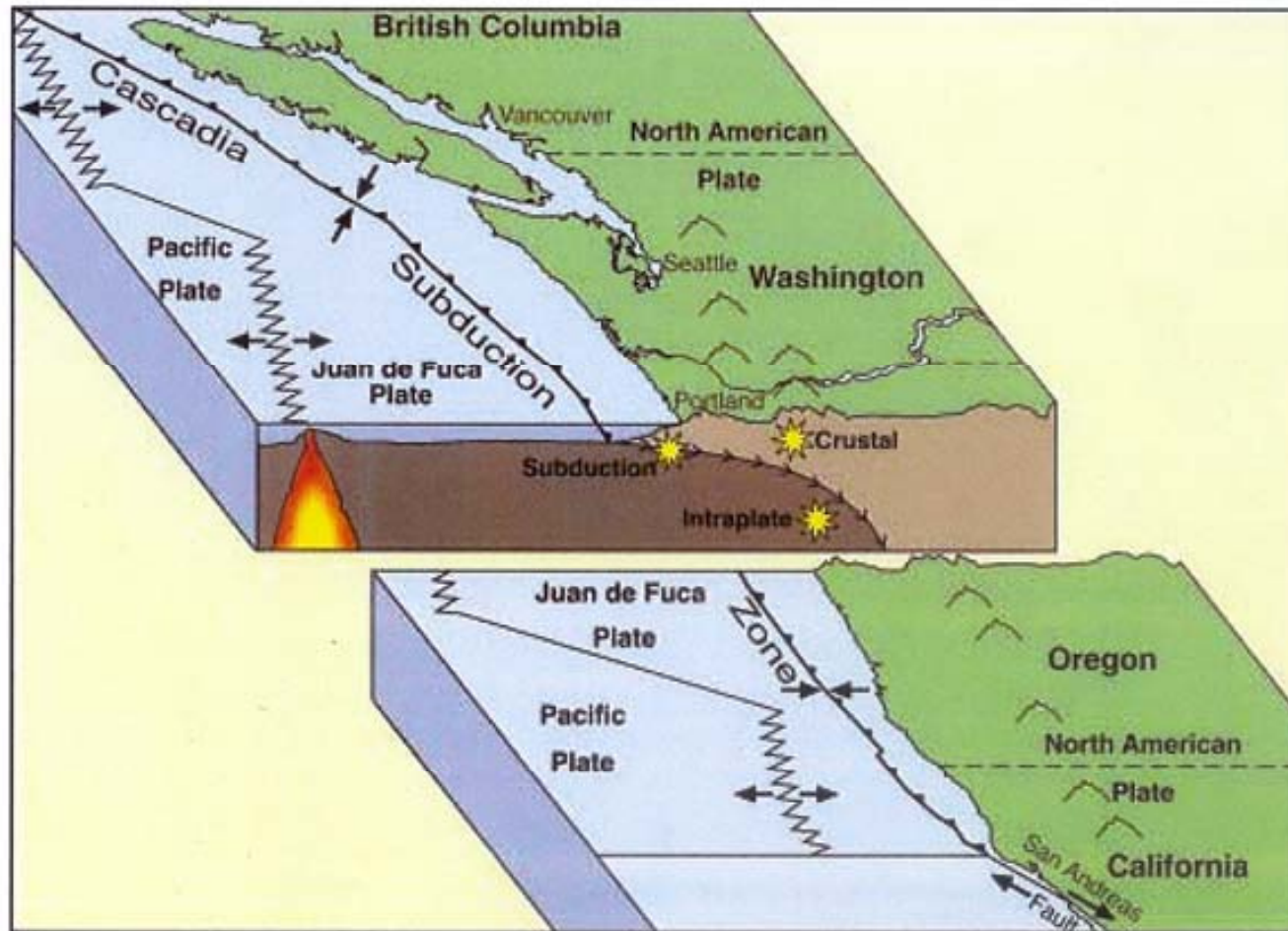


REGIONAL EARTHQUAKE IS A MAJOR RISK

- ▶ EARTHQUAKE – RICHTER 9.0 EARTHQUAKE WITH NO WARNING REPRESENTS BPA'S PRIMARY RISK.
- ▶ BPA'S CURRENT VANCOUVER, WA TRANSMISSION SCHEDULING FACILITY IS LOCATED IN THE CASCADIA SUBDUCTION ZONE
- ▶ THE CASCADIA SUBDUCTION ZONE MEGA-THRUST FAULT EXTENDS ALL THE WAY FROM VANCOUVER ISLAND DOWN TO CALIFORNIA ALONG THE PACIFIC COAST.



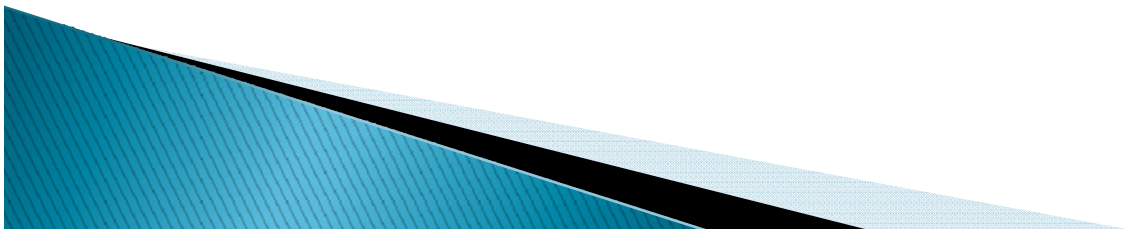
MAP OF CASCADIA SUBDUCTION ZONE



Pacific Northwest earthquake setting. Map and cross section showing the Cascadia Subduction Zone (courtesy of Oregon Department of Geology and Mineral Industries)

EFFECTS OF RICHTER 9.0 EARTHQUAKE INCLUDE:

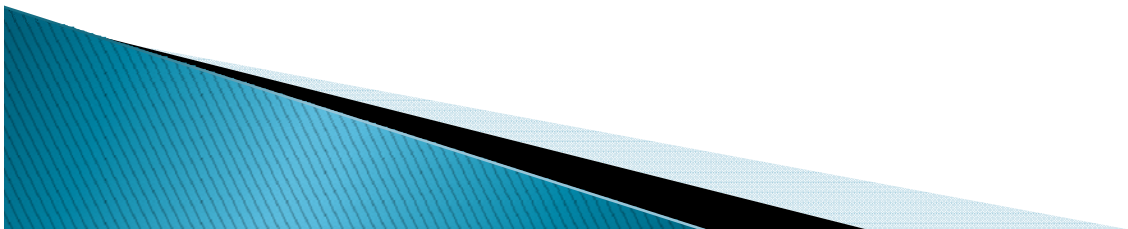
- ▶ IMMEDIATE LOSS OF UP TO 10,000 MWs FROM LOAD CENTERS IN THE IMPACTED AREA (WEST OF CASCADES)
- ▶ LOSS OF 3,000 – 6,000 MWs OF FEDERAL COLUMBIA RIVER POWER SYSTEM GENERATION
- ▶ MAJOR DESTRUCTION TO TRANSPORTATION INFRASTRUCTURE IN THE PORTLAND – VANCOUVER METRO AREA. MAJORITY OF INTERSTATE 5 IMPASSABLE
- ▶ MASS CIVILIAN CASUALTIES



RESULTS OF US DOE 2007 INTERNAL REVIEW

- ▶ US DEPT OF ENERGY REVIEW DETERMINED THAT BPA.....

“ DID NOT HAVE ACCEPTABLE GEOGRAPHIC SEPARATION OF PRIMARY AND BACK-UP SCHEDULING FACILITIES”



WHAT OTHER MAJOR TRANSMISSION OWNERS ARE DOING TO MITIGATE RISK

- ▶ BC HYDRO (BCTC) – BCTC HAS ONE SYSTEM CONTROL CENTER IN THE FRASER VALLEY AND A BACK-UP CONTROL CENTER IN THE SOUTHERN INTERIOR
- ▶ CAISO – FULLY REDUNDANT AND STAFFED CONTROL CENTERS IN FOLSOM AND ALHAMBRA (NORTHERN & SOUTHERN CALIFORNIA)
- ▶ PACIFICORP – STAFFED CONTROL CENTERS IN PORTLAND AND SALT LAKE WITH COMMON CAPABILITY
- ▶ TVA – BACK-UP SITES WITH STAFF THAT CAN PROVIDE OPERATIONS SUPPORT FOR A SHORT PERIOD



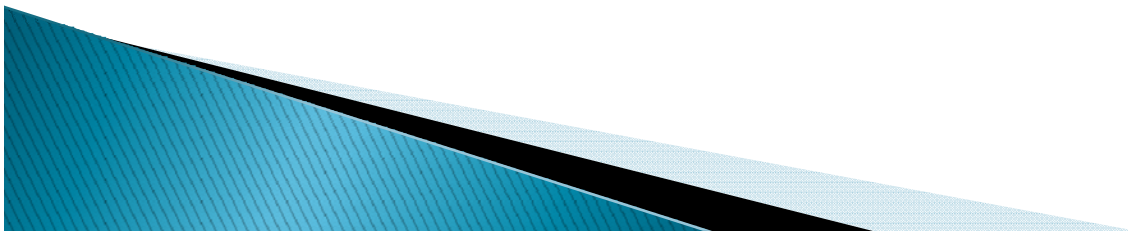
SPOKANE, WA WAS SELECTED AS THE SITE OF BPA'S NEW PERMANENT ALTERNATE CONTROL CENTER

SELECTION OF SPOKANE WAS DUE TO THE LOW SEISMIC
ACTIVITY OF THE GEOGRAPHIC AREA.



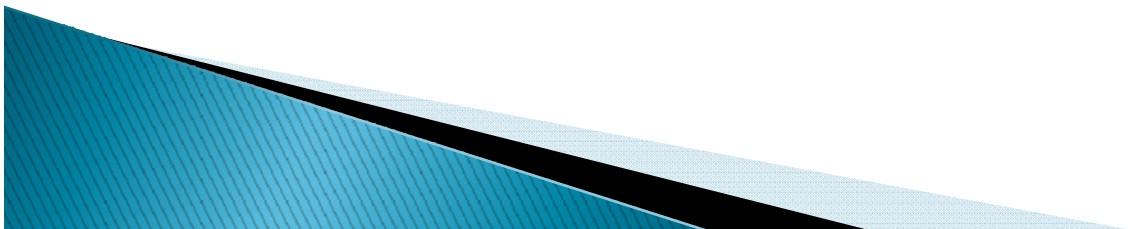
MSC CONSTRUCTION / OCCUPATION TIMELINE

- ▶ CONSTRUCTION OF THE MSC BUILDING STARTED APRIL 2013 AND WILL BE COMPLETED JULY 2014
- ▶ EXPECTED TO BE STAFFED AND FULLY OPERATIONAL DURING OCTOBER 2014 – MARCH 2015 TIMEFRAME.



REAL TIME STAFFING

- ▶ CURRENTLY ALL REAL-TIME TRANSMISSION SCHEDULERS ARE LOCATED IN VANCOUVER, WA. – AND WORK A 24 / 7 SHIFT ROTATION
- ▶ THE FUTURE: REAL-TIME TRANSMISSION SCHEDULERS WILL BE LOCATED IN THE VANCOUVER AND SPOKANE, WA SCHEDULING CENTERS – AND WORK A 24 / 7 SHIFT ROTATION
- ▶ REAL-TIME TRANSMISSION SCHEDULERS WILL WORK AS ONE TEAM DESPITE BEING SPLIT BETWEEN TWO DIFFERENT GEOGRAPHIC LOCATIONS

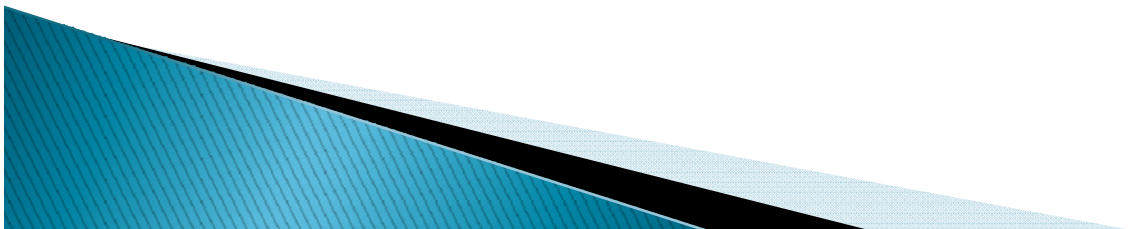


TECHNOLOGY IMPROVEMENTS

BPAT IS MAKING TECHNOLOGY IMPROVEMENTS TO:

ENHANCE COMPUTER NETWORKS, DATA LINKS, COMMUNICATION PROTOCOLS AND OTHER TOOLS REQUIRED TO MAINTAIN SEAMLESS TRANSMISSION OPERATIONS BETWEEN BOTH FACILITIES

ALLOW EACH TRANSMISSION SCHEDULER TO HAVE A COMMON OPERATING PICTURE AND SITUATIONAL AWARENESS TO RESPOND TO CHANGING OPERATIONAL CONDITIONS



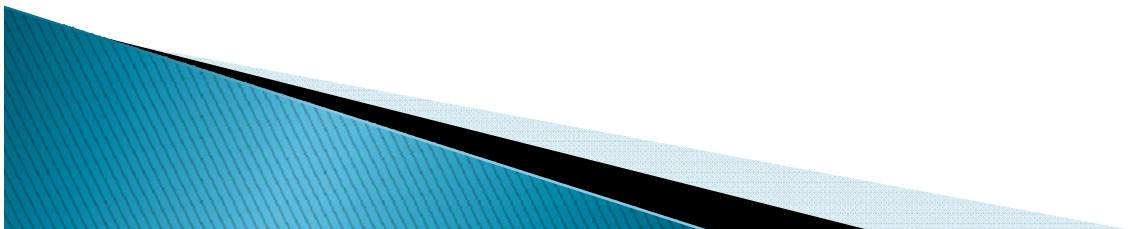
TEST ROOM

- ▶ BPAT CONSTRUCTED A TEST ROOM EQUIPPED WITH TWO SCHEDULING DESKS TO SIMULATE OPERATIONS IN SPOKANE

- ▶ TEST ROOM ALLOWS BPAT TO:
 - TEST DIFFERENT STAFFING SCENARIOS

 - DESIGN, TEST, EVALUATE AND IMPLEMENT NEW AND IMPROVED SCHEDULING PROCEDURES AND TECHNOLOGY TO BE USED WHEN THE MSC IS IN OPERATION.

 - GIVE THE STAFF AN IDEA WHAT IT IS LIKE TO OPERATE IN TWO DIFFERENT LOCATIONS





Craig L. Williams
Market Interface Manager
UFAS Liaison

WECC Bifurcation Update
October 16, 2013
NWPP Schedulers Meeting

Bifurcation Milestones - Summary

- Bifurcation team focused on activities that **MUST** be completed by January 1, 2014 for the launch of new company — Peak Reliability.
- Key work streams are in place: Legal; Contracts; Finance; Human Resources, IT and Communications.

Critical Path Items

- Contracts — Completion of all contracts that must be executed prior to January 1, 2014.
 - A Master Contract Spreadsheet has been documented.
 - The process of identifying contract priority, complexity of work, schedule and resources is underway.
- Employee transition to Peak Reliability:
 - Several labor-intensive efforts include negotiating new benefit plans and software agreements;
 - Completing all new hire/transfer activities;
 - Reconfiguration of the 100 plus workstations, badges and email accounts.

General Organizational Activities

Milestone	Due	Status
Determine RCCo company name	Completed	Complete
Peak Board Members elected and in place	Completed	Complete
Key Peak staff hired	Nov. 15	On Schedule
WECC Board Members elected and place	Dec.	On Schedule

Key code	
Complete	Blue
On Schedule	Green
Delay	Yellow
At Risk	Red

Legend: All dates are 2013 except where indicated

Peak Reliability Board of Directors

Brian Silverstein

- **Interim Board Committee Chair**
- Brian Silverstein, resident of Lopez Island, WA, is the Chair of the Interim Board Committee. Mr. Silverstein retired from Bonneville Power Administration in 2011 after a 33-year career. He was most recently Senior Vice President for Transmission Services. Mr. Silverstein has also served on the NERC Reliability Issues Steering Committee.
- Mr. Silverstein earned his master's degree in electric power from Rensselaer Polytechnic Institute, and his Bachelor's degree in electrical engineering from The Cooper Union. He is a registered professional engineer in Oregon.

Peak Reliability Board of Directors

T. GRAHAM EDWARDS

- **Chief Executive Officer, ElectriCities of North Carolina, WECC Finance and Audit Committee Chair**
- Resident of Isle of Palms, South Carolina, has more than 33 years experience in the electric utility industry, including board of directors' leadership, serving as president and CEO of three different utilities, and working in a variety of planning and operations roles.
- Since 2009, Mr. Edwards has served as the CEO for ElectriCities of North Carolina, Inc., a public power utility in North Carolina. From 2001–2005, Mr. Edwards sat on the Board of the Midwest Independent System Operator, Inc., serving as its chair in 2005. He remained as President and CEO of the Midwest ISO until 2009.
- Mr. Edwards earned a Bachelor of Science in Business Administration from Francis Marion University, Florence, South Carolina; and a Master of Business Administration from The Citadel, Charleston, South Carolina.



Peak Reliability Board of Directors

John Meyer

- **WECC Standards Committee Chair, WECC Compliance Committee Member**
- John Meyer, of Manvel, Texas, joined WECC's Board as a nonaffiliated director in 2011. He has spent more than 35 years working in engineering, management, and consulting roles in the electric utility industry. Since 2007, Mr. Meyer has been an independent consultant and has served as the chair of the Southwest Power Pool Regional Entity Board of Trustees. He has direct experience with WECC, serving as a member of its Reliability Policy Issues Committee as a representative of Class 7 members.
- Mr. Meyer has worked for Houston Lighting and Power, Reliant Energy, and Reliant Resources. During his career, Mr. Meyer demonstrated expertise in areas such as electric utility operations, regulatory and market rules, transmission line design and planning, and reliability
- Mr. Meyer holds a Bachelor of Science in Electrical Engineering from Lamar University, Beaumont, Texas; and a Master of Science in Electrical Engineering from the University of Houston, Texas.



Peak Reliability Board of Directors

Newly Elected Members of the Board as of October 4, 2013

- ***Robert L. Barnett***
- ***Linda A. Capauno***
- ***Milton B. Lee***
- ***John H. Stout***

Link to Credentials [here](#)





Peak Reliability



PEAKRELIABILITY
assuring the wide-area view

Legal

Milestone	Due	Status
Peak officially incorporated	Oct. 21	
Interchange Authority assignment complete	Nov. 27	
Critical contract assignments executed	Dec. 19	
WECC assignment of WISP contracts to Peak	Jan. 3, 2014	





Key code	
Complete	
On Schedule	
Delay	
At Risk	

Legend: All dates are 2013 except where indicated



Employee Transition

Milestone	Date Due	Status
Peak HR system operational	Oct. 22	Complete
Benefit plans in place	Nov. 15	Complete
Peak policies and procedures revised and posted	Dec. 31	Delay
Employees transferred to Peak	Jan. 1, 2014	Delay

Key code	
Complete	
On Schedule	
Delay	
At Risk	

Legend: All dates are 2013 except where indicated



Finance

Milestone	Due	Status
Peak payroll system set-up	Oct. 15	At Risk
Peak financial systems in place	Dec. 31	On Schedule
Peak budgeting system in place	Jan. 15, 2014	On Schedule
Peak takes over fixed asset system	Feb. 2, 2014	On Schedule

Key code	
Completed	Blue
On Schedule	Green
Delay	Yellow
At Risk	Red

Legend: All dates are 2013 except where indicated

Information Technology

Milestone	Due	Status
Confirm Microsoft license transfers to Peak	Completed	Completed
Complete Peak server installations	Oct. 10	On Schedule
Peak internet / intranet site ready for rollout	Dec. 16	On Schedule
Complete network configuration/separation	Dec. 31	On Schedule

Key code	
Completed	Blue
On Schedule	Green
Delay	Yellow
At Risk	Red

Legend: All dates are 2013 except where indicated

Questions?



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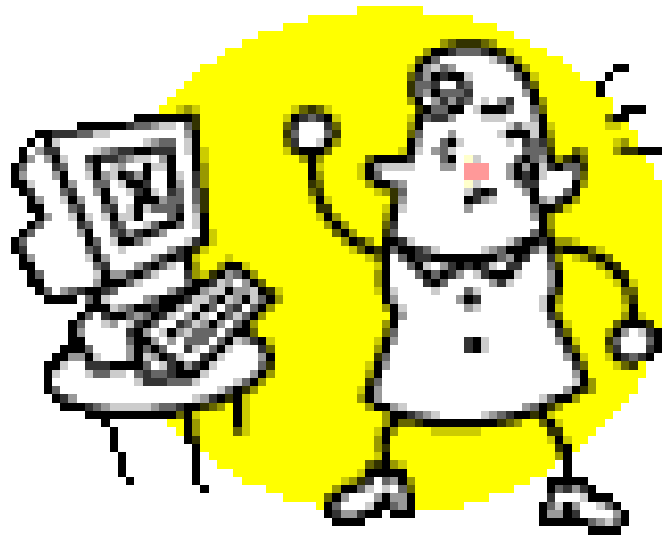


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Market Interface Manager

Enhanced Curtailment Calculator (ECC) Review
October 16, 2013
NWPP Schedulers Meeting

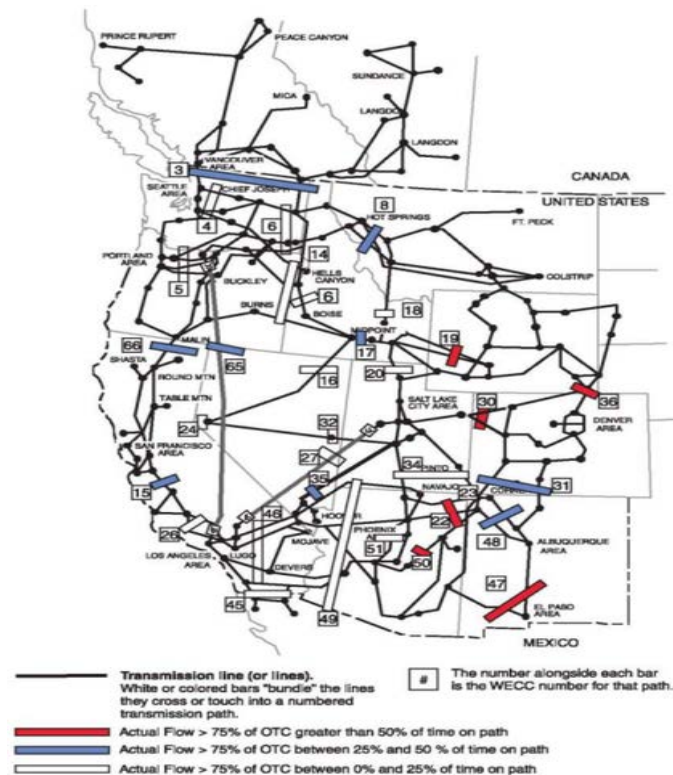
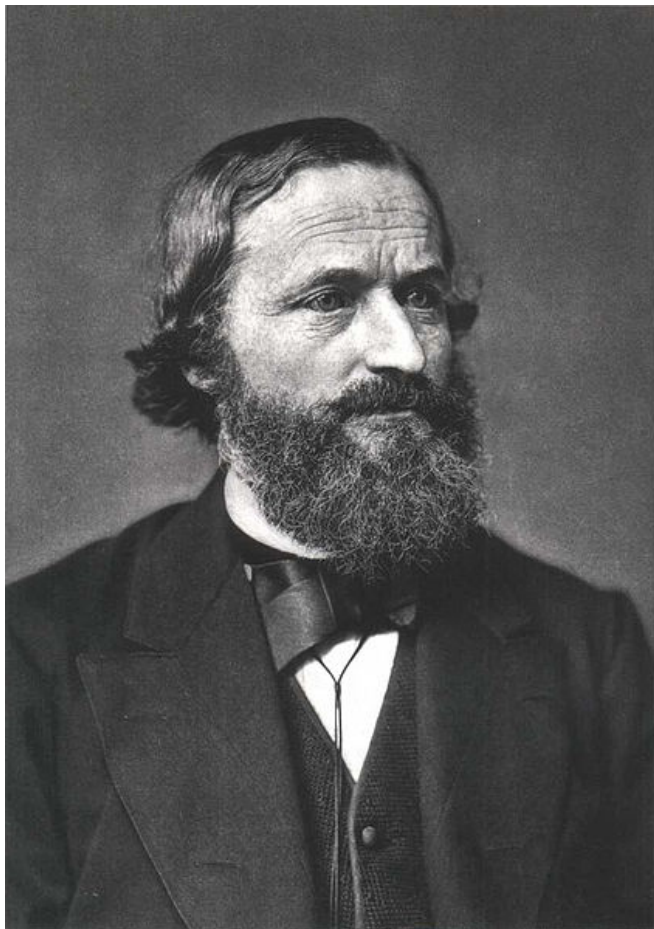
What is the root of the USF issue?

- Great Schedulers like yourselves work hard all day long to make sure that every MW has a correct path from source to sink, and it's all wrong.



Reality versus the sheet

- Power doesn't go where we schedule it.

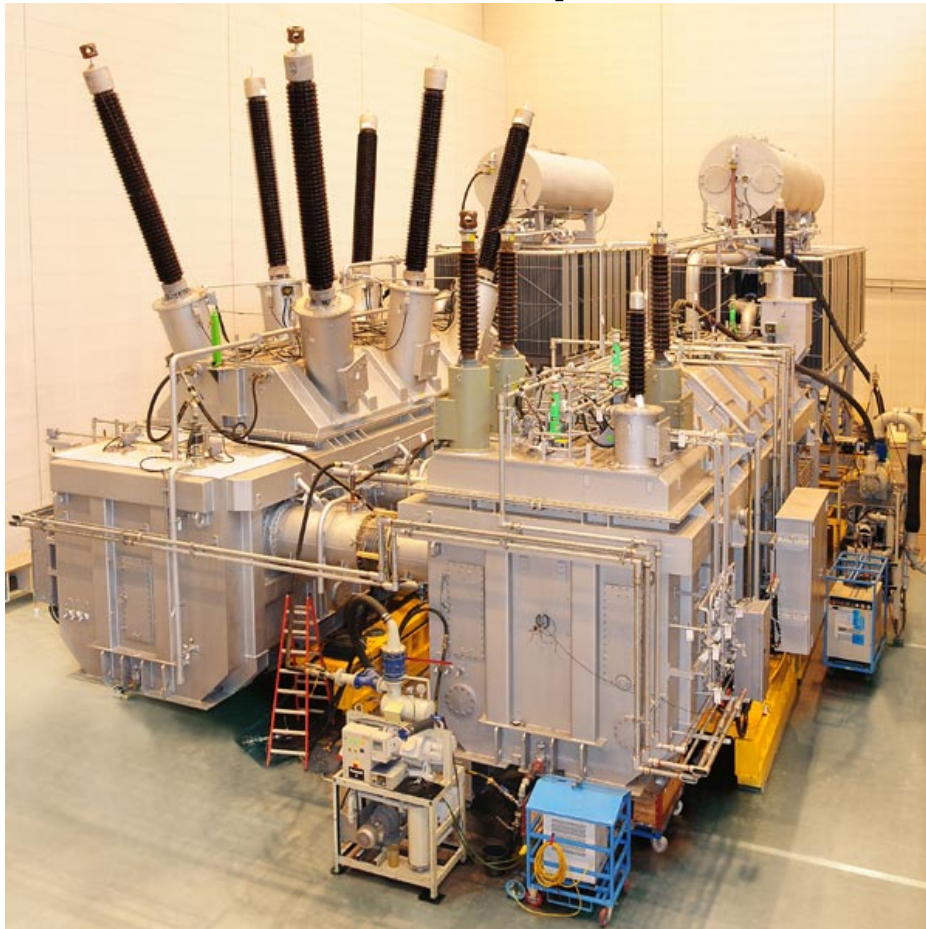


WECC calls this Unscheduled Flow

- The idea of scheduled and unscheduled flow on a contract path is a very Western idea. In most places, no distinction is made between scheduled and unscheduled flow,
 - there is just flow. And it follows Kirchhoff's Law.

First WECC uses COPS

- *Coordinated Operation of Phase Shifters*



Next Step: webSAS

- WECC next utilizes a congestion management plan that has at its core a software program called **webSAS** that calculates the magnitude of unscheduled flows and assigns relief obligations to BAs accordingly.

Review of Current Status

- However, it has also long been known that the webSAS calculations are not complete and therefore it does not provide correct estimations of the magnitude of unscheduled flows, and does not assign relief obligations accurately.

Review of Current Status

- The **Enhanced Curtailment Calculator (ECC)** is a project that would create a “next generation” software program that would correct deficiencies in the webSAS program and add additional capabilities to provide broader tools for congestion management in the Western Interconnection.

Review of Current Status

- As part of the cost justification for the Enhanced Curtailment Calculator (ECC), the WECC RC in conjunction with the ECC Advisory Committee identified four (4) major deficiencies currently in the webSAS program and methodologies for the RC to estimate the costs associated with these issues.

Costs due to webSAS deficiencies

webSAS Calculation Deficiency	Explanation	Cost Per Year
Lack of Real-Time Transmission Topology	webSAS uses Transmission Distribution Factors (TDFs) that are calculated twice a year assuming that all lines are in service. The error associated with this assumption varies day-to-day but distorts the calculated flows and relief obligations.	\$535,619

Costs due to webSAS deficiencies

webSAS Calculation Deficiency	Explanation	Cost Per Year
Does not account for non-tagged uses of the Transmission System.	Approximately 40% of the energy flowing on the transmission system in the Western Interconnection is not tagged and webSAS does not account for these uses of the system.	\$481,652

Costs due to webSAS deficiencies

webSAS Calculation Deficiency	Explanation	Cost Per Year
Lack of Real-Time Generation Outage Topology	webSAS does not account for generation outages in real-time or in its base calculations. The difference between the base case calculations and the actual generation profiles in the interconnection result in additional error.	\$101,727

Costs due to webSAS deficiencies

webSAS Calculation Deficiency	Explanation	Cost Per Year
Lack of POR/POD Granularity for e-Tag Evaluation	webSAS utilizes a series of large zones for estimating the transmission distribution of flows on the system. The ECC would correct and enhance this calculation to bring it to the POR/POD level consistent with the e-tag.	\$111,900

Total Estimated Costs per Year

- Real-Time Transmission Topology \$535,619
- Untagged Uses of the System \$481,652
- Real-Time Generation Topology \$101,727
- Lack of POR/POD Granularity \$111,900

• **TOTAL \$1,230,898**

Other costs?

- Book-outs \$???
- Liquidated damages \$???
- Finding new ATF people \$???
- Lost productivity \$???

• **TOTAL \$???**

ECC Timetable

- **Phase 1** – RC implements in late 2014
 - Real-time grid topology
 - POR/POD granularity
 - Comparable treatment of tagged and non-tagged uses
 - Only Qualified Paths
- **Phase 2** – RC implements in late 2015
 - Incorporate all monitored transmission elements
 - In-hour and dynamic schedules
 - Outage Transfer Distribution Factor added

What will End Users notice?

- **Phase 1** – RC implements in late 2014
 - Probably nothing much
 - Same interface, better calculations
- **Phase 2** – RC implements in late 2015
 - More curtailment events possibly for all elements
 - Tags and generation subject to curtailment
 - A more proactive implementation rather than reactive
- **Phase 3** – A new WECC Plan? Markets?

Questions?



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Energy Imbalance Market Implementation

John Apperson

October 16, 2013



Topics

- Energy Imbalance Market (“EIM”) basics
- PacifiCorp stakeholder process, efforts and timeline
- Market design highlights and implementation processes



EIM basics: what EIM is

- The EIM is a market for efficient automated dispatches administered by the Market Operator
- Relative to bilateral transactions for load service, EIM is anticipated to comprise a very small amount of total transaction volume, limited to managing a portion of real time imbalances
- Can result in optimization of PacifiCorp's BAAs or co-optimization with CAISO BAA

EIM basics: important “nots”

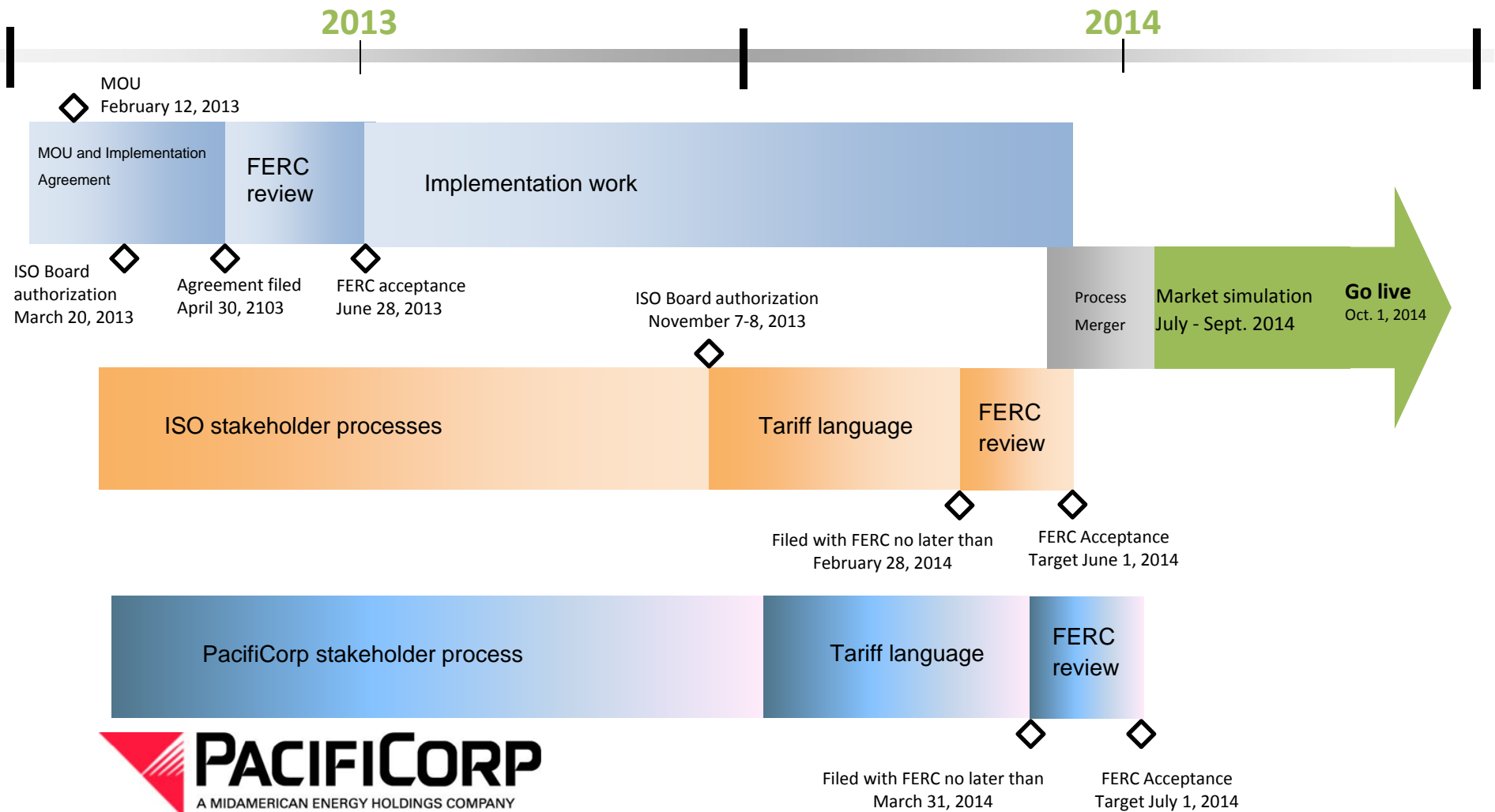
- An EIM is not a Regional Transmission Organization (RTO). All participating balancing authorities maintain control of their assets and associated reliability compliance obligations.
 - The EIM will not affect PacifiCorp's contingency reserve obligations or reserve sharing agreements.
- The EIM does not require that parties consolidate balancing authority areas.
- EIM participants are not required to bid- they voluntarily make available generation resources that will be optimized to balance load and generation every five minutes across the entire EIM footprint.

PacifiCorp stakeholder process

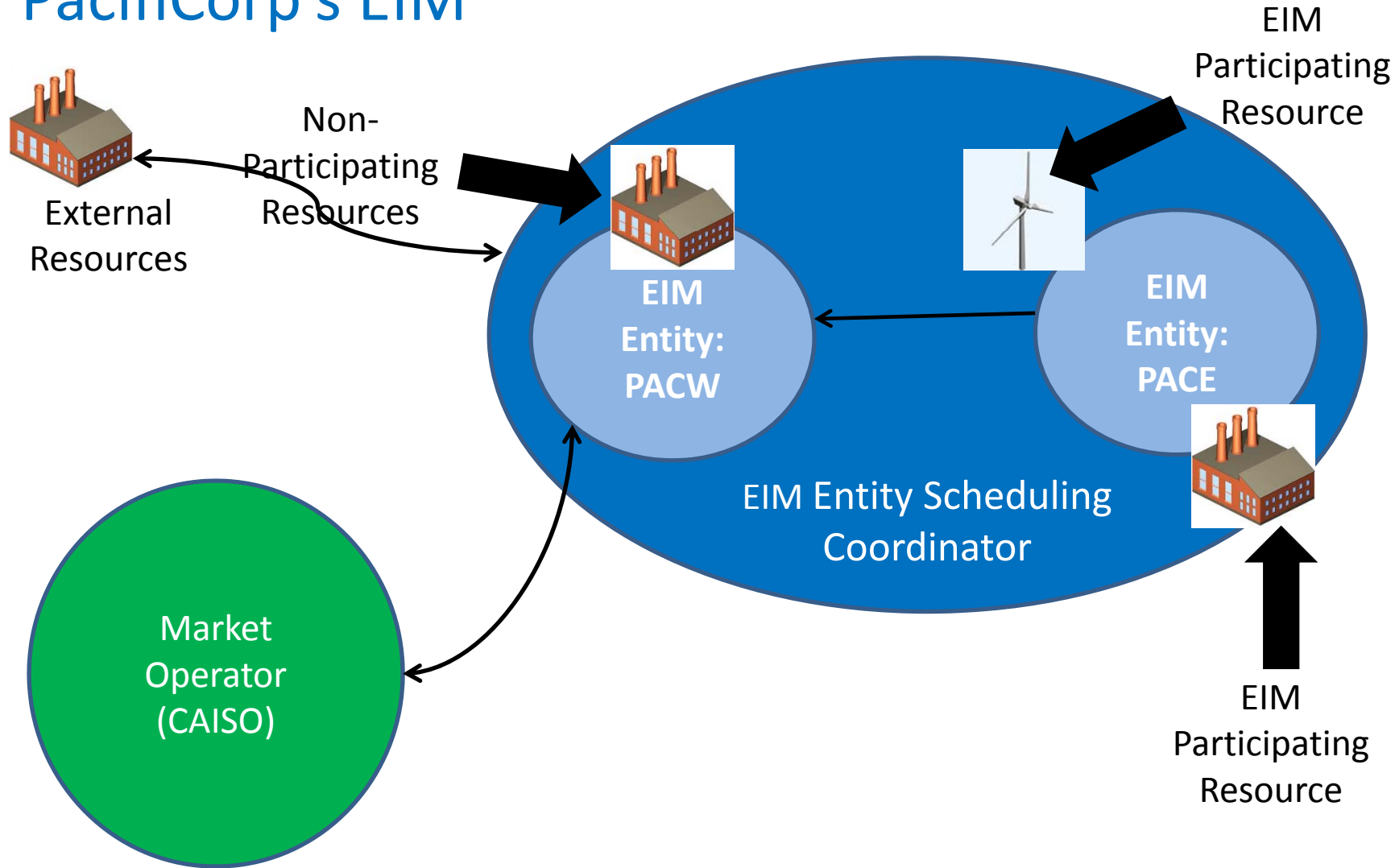
- PacifiCorp stakeholder process designed to mirror ISO process, but account for timing and procedures specific to PacifiCorp stakeholders
- PacifiCorp stakeholder process concludes with the filing of tariff revisions for EIM implementation with FERC no later than March 31, 2014
- PacifiCorp EIM stakeholder meetings held **April 16, May 28, and July 30, 2013**
- PacifiCorp has published a stakeholder plan with key dates
- PacifiCorp also published its EIM Entity Proposal **September 13, 2013** and a revision **October 18, 2013**
- PacifiCorp EIM stakeholder meeting November 6, 2013, in Salt Lake City

All EIM materials and announcements for PacifiCorp's process are updated and can be found at:
<http://www.oasis.oati.com/ppw/index.html>

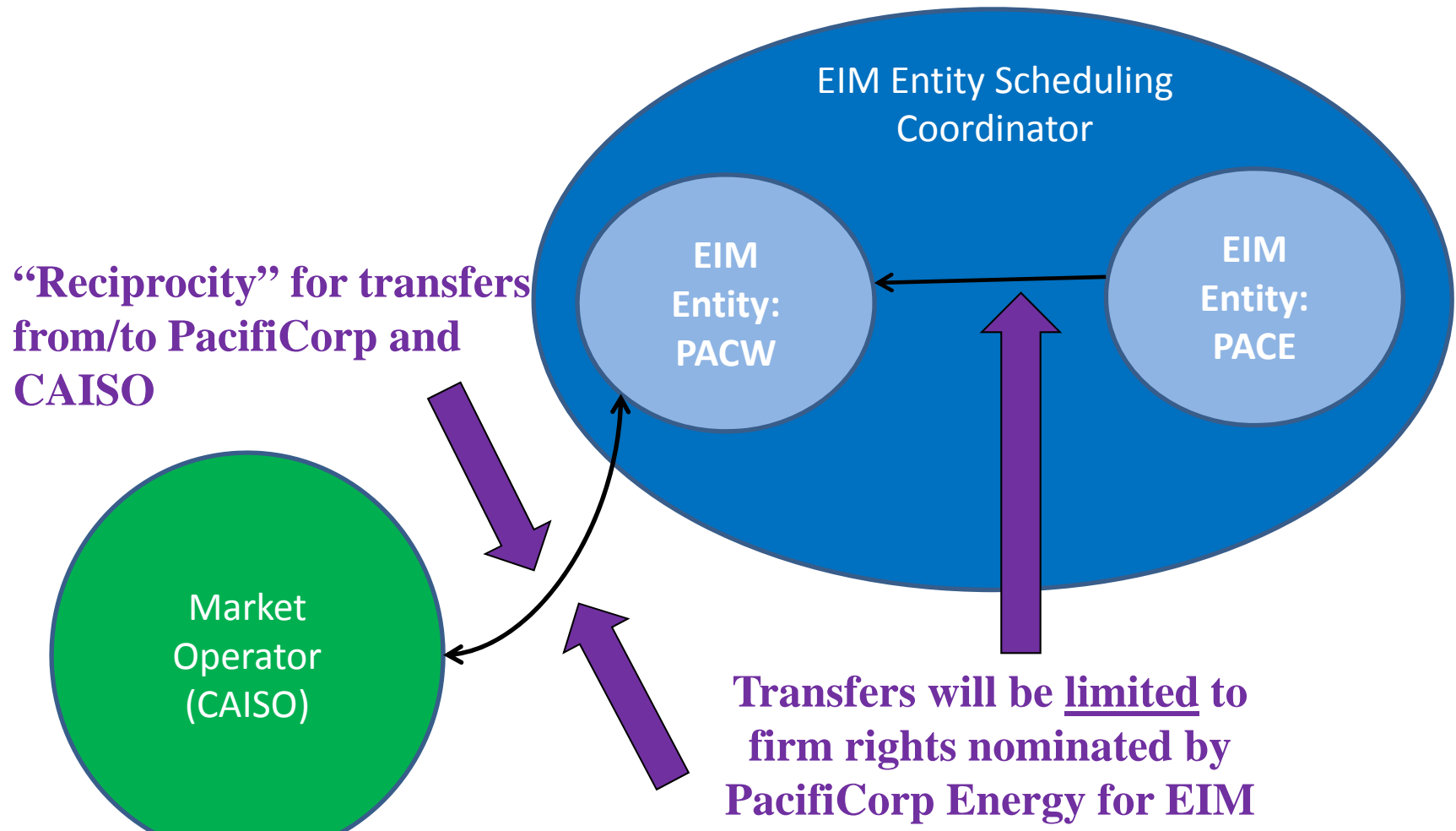
EIM stakeholder process is working in parallel with PacifiCorp implementation



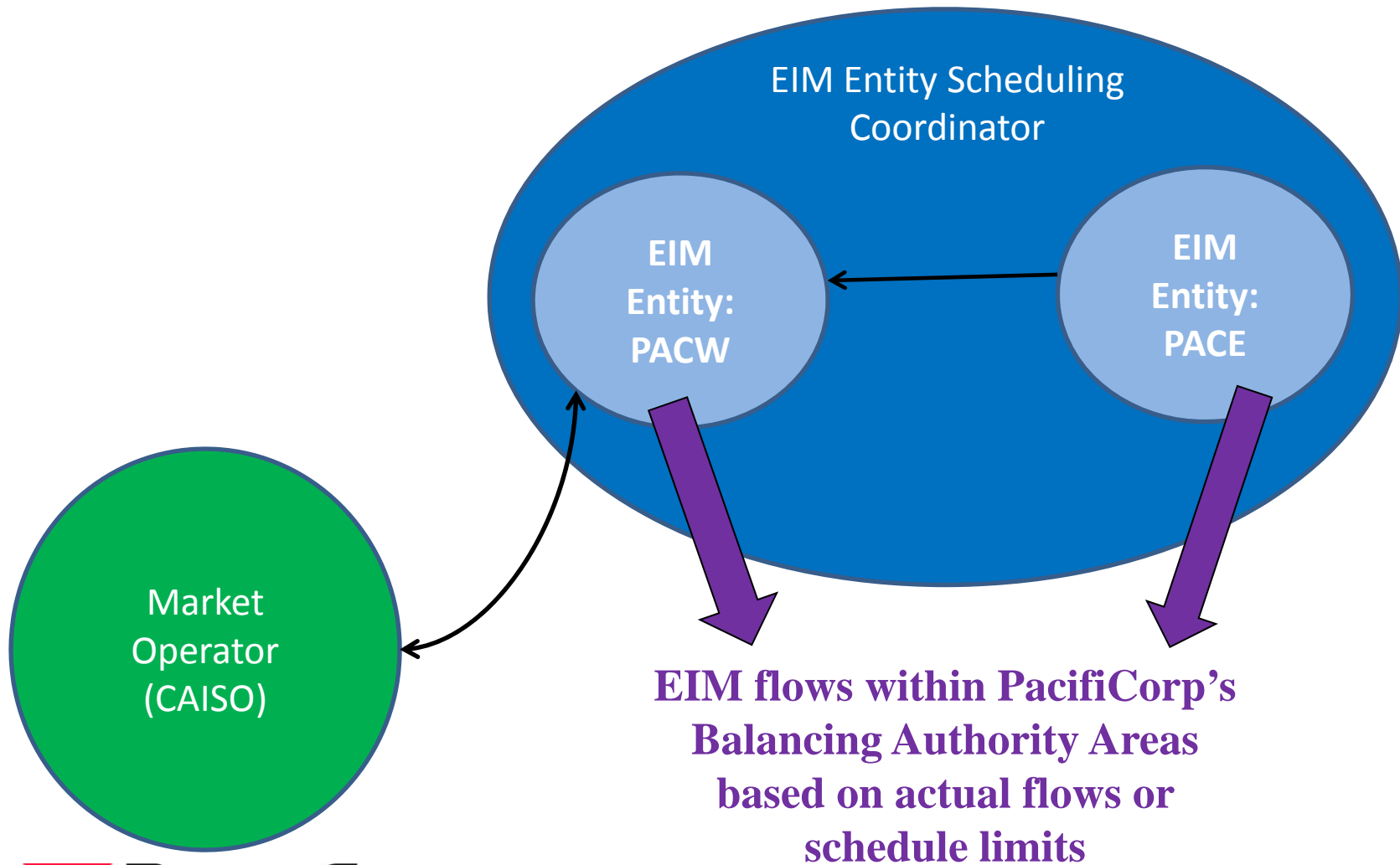
PacifiCorp's EIM



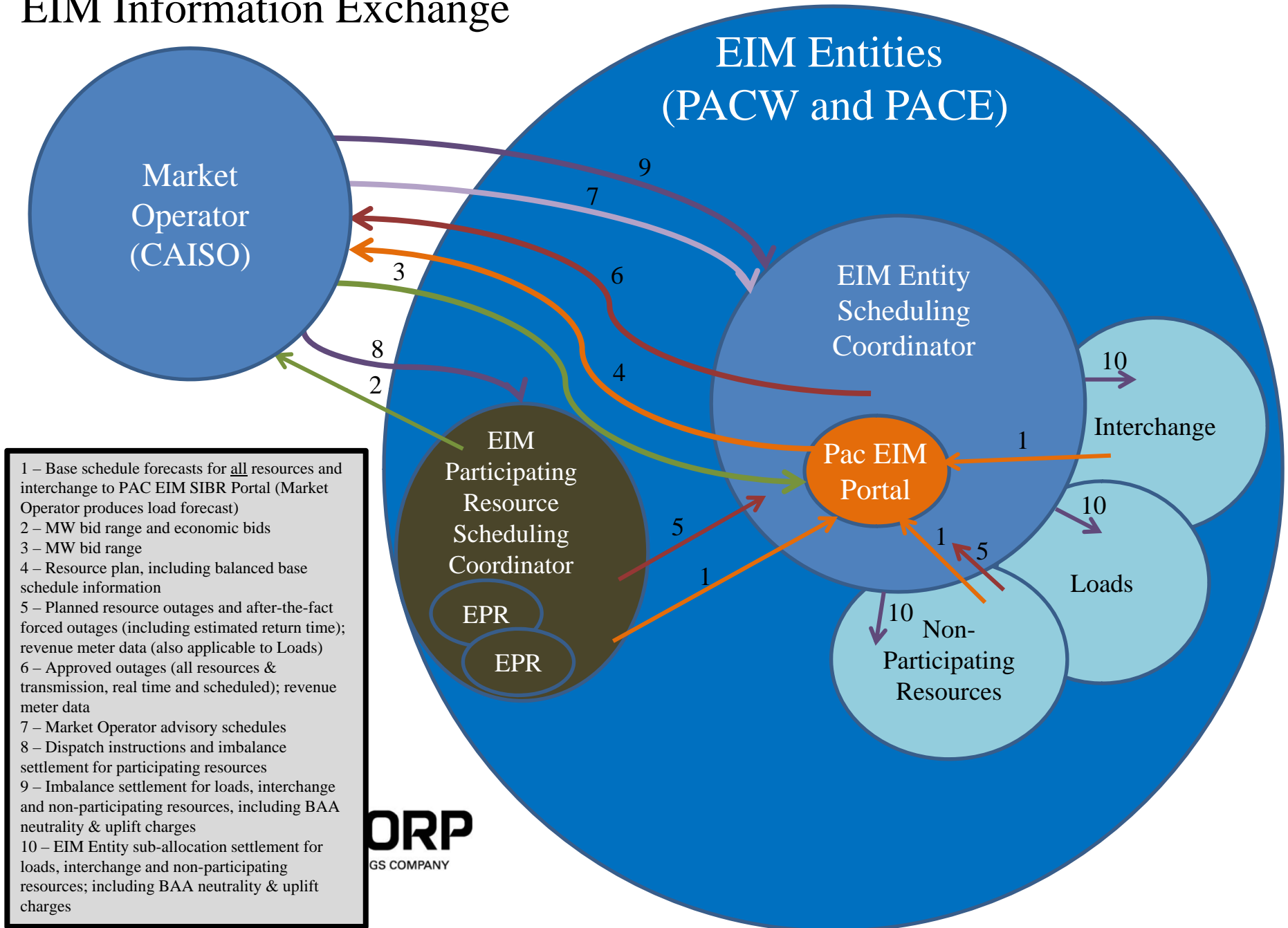
CAISO-PACW-PACE EIM transfers



EIM Transfers within PacifiCorp



EIM Information Exchange



- 1 – Base schedule forecasts for all resources and interchange to PAC EIM SIBR Portal (Market Operator produces load forecast)
- 2 – MW bid range and economic bids
- 3 – MW bid range
- 4 – Resource plan, including balanced base schedule information
- 5 – Planned resource outages and after-the-fact forced outages (including estimated return time); revenue meter data (also applicable to Loads)
- 6 – Approved outages (all resources & transmission, real time and scheduled); revenue meter data
- 7 – Market Operator advisory schedules
- 8 – Dispatch instructions and imbalance settlement for participating resources
- 9 – Imbalance settlement for loads, interchange and non-participating resources, including BAA neutrality & uplift charges
- 10 – EIM Entity sub-allocation settlement for loads, interchange and non-participating resources; including BAA neutrality & uplift charges

Questions?

