



# **WIRAB Monthly Update**

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WIRAB Staff

October 1, 2020



## Introductions and Roll Call

# Outline

- **WECC Activities**
  - WECC Update
    - Jordan White, WECC
  - WECC Report: Reliability Implications of Expanding the EIM to Include Day-Ahead Market Services
- **WIRAB Activities:**
  - Upcoming Meetings





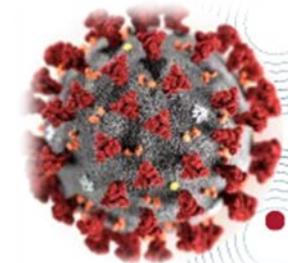
# WIRAB Update

October 1, 2020

Jordan White  
Vice President of  
Strategic Engagement and  
Deputy General Counsel

# COVID-19 and WECC

- No target date for office re-opening. The health and safety of staff and stakeholders is most important
  - Initial re-opening will be voluntary
- All stakeholder meetings will be held **virtually through end of 2020**
- Go to [wecc.org](https://wecc.org), click on COVID graphic for more information



# Annual Meeting Recap

- Peter Mackin received the Armando J. Perez Outstanding Contributor Award
- Long-Term Strategy  APPROVED
- Guest Speaker, Rob Manning, NERC Board of Trustees
- The Technical Session featured Manny Cancel, E-ISAC CEO



# Board and MAC Leadership Changes

- Change in Board leadership:
  - Ian McKay — Chair
  - Richard Campbell — Vice Chair
- Change in MAC leadership:
  - Brenda Ambrosi, BC Hydro — Chair
  - Thad LeVar, Utah Public Service Commission — Vice Chair



Ian McKay  
Chair



Richard Campbell  
Vice Chair

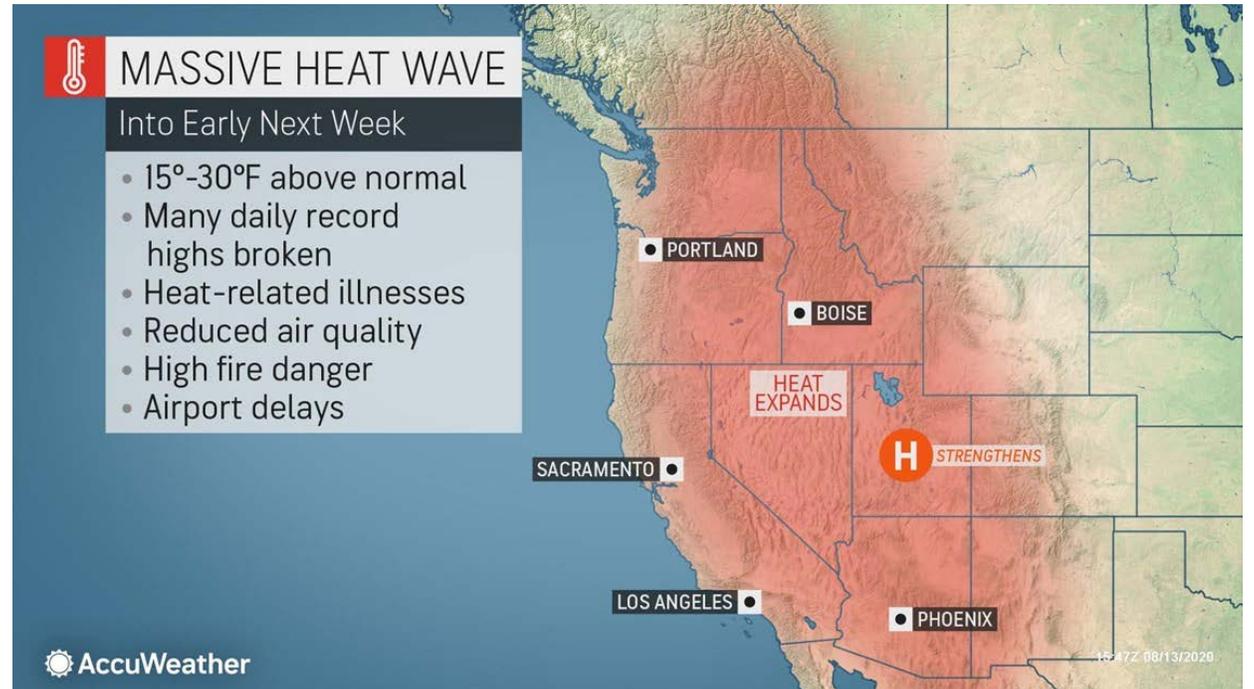
# Western Assessment

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- In initial drafting phase
- Dividing the West into regions, with NW divided into separate summer and winter peaking subregions for more clarity
- Providing capacity information differently
  - Prior to firm imports
  - In MW and margin percentages
- Analyzing scenarios, including the least favorable resource assumptions
- Providing more detailed data and information for decisionmakers

# California August 14-15 Event

- Extremely hot conditions across the West
- Near-record demand levels in California
- 1,087 MW of firm load shed on August 14
- 692 MW of firm load shed on August 15



Source: <https://www.abc10.com/article/weather/accuweather/heat-wave-weather-forecast-western-us/507-f22bddea-cbed-4122-9828-0d60ae22a887>

# Resource Adequacy Forum

- WECC Resource Adequacy Forum
  - November 18, 2020
  - Agenda almost finalized
  - More information coming soon!



# Stakeholder Engagement Task Force

- Reinventing the way WECC interacts with stakeholders
- Looking at how WECC
  - Partners with stakeholders to do relevant and timely technical work
  - Accesses stakeholder expertise in a nimble and flexible way
  - Understands and addresses the needs of various stakeholder groups
- Stakeholder feedback opportunities along the way
- Tasked with making recommendations to the Board by the end of 2020





**WECC**

Electric Reliability and Security for the West

## Contact:

Jordan White

Vice President of Strategic Engagement and  
Deputy General Counsel

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**WECC**

Qualitative Reliability Assessment of  
Expanding the EIM to Day-ahead Market  
Services

October 1, 2020  
WIRAB Monthly Meeting

MIC Market Expansion Assessment  
Working Group

# Today's Presenters

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- Alaine Ginocchio, Program Manager – Wholesale Electricity Markets, Western Interstate Energy Board
- Jason Smith, Director of Transmission, Orsted
- Dillon Kolkmann, Energy Industry Analyst, Office of Electricity Policy and Innovation, FERC



# Overview of Presentation

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- Introduction
- Overview of the Report
- Market Comparison: Bilateral vs. EIM+DAMS
- Three Potential Reliability Benefits
  - Increased Coordination in Day-ahead Operations
  - Improved Response to Variability in Loads and Resources
  - Improved Transmission Congestion Management
- Conclusion



# Overview of Report

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- A *qualitative* assessment of potential *reliability* impacts from expanding EIM to include day-ahead market services.
- No quantitative or economic analysis
- Based on assumptions for the market design: Participation in day-ahead market without full integration into CAISO BA.
  - BA's retain reliability compliance responsibilities
  - Responsibility for integrated resource planning, resource adequacy procurement, and transmission planning and investment are unchanged
  - Functional control of transmission facilities is not transferred to the market operator



# Overview of Report

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- Goals of Report
  - Describes key changes in day-ahead processes and the potential impact these changes could have on reliability
  - Accessible to WECC Board of Directors & state & provincial policymakers and regulators
  - First step in evaluating reliability impact of this potential market expansion



# Overview of Report

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- Reliability: A reliable electric system is one that is able to meet the electricity needs of end-use customers even when unexpected equipment failures or other factors reduce the amount of available electricity
- Evaluating impact of DAMS addition to current EIM participation
  - Day-ahead (DA) operations now outside of CAISO: bi-lateral market
  - Real-time operations: EIM
  - DA operations in an EIM + DAMS: CAISO's current DA operations with some adjustments



# Overview of Report

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Report assesses five areas:

1. General day-ahead operations\*
  1. VER\*
  2. Resource Sufficiency
  3. Gas-Electric Coordination
2. Transmission congestion management\*
3. BA to BA Coordination\*
4. Ancillary services
5. Contingency analysis

\* Today focus on a few.



# Three Potential Reliability Benefits

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1. Increased Coordination in Day-ahead Operations
2. Improved Response to Variability in Loads and Resources
3. Improved Transmission Congestion Management

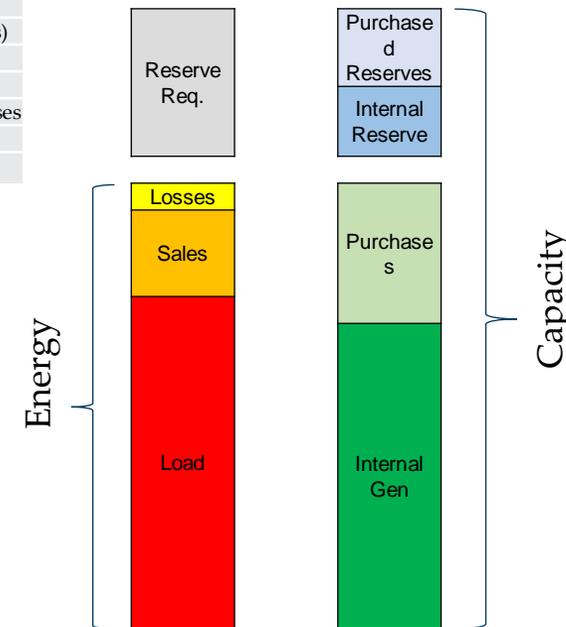


# Balancing Authority Area

- The collection of generation, transmission, and loads within the metered boundaries of the Balancing Authority. The Balancing Authority maintains load-resource balance within this area.

- Generation (Resource)
- Load (Demand)
  - Internal customers
  - Sales/exports
- Operating Reserves
  - Maintain the balance
- Energy vs. Capacity
- Real-time (RT) vs. Day-Ahead (DA)
- Set-up for the entire day vs one-hour
- Optimization

Energy	
Credits	Debits
	- Load (Customers)
	- Sales (Exports)
+ Internal Generation	
	- Transmission Losses
+ Purchases	
Total = Total	



# What does “Optimization” mean?

- Security Constrained Unit Commitment (SCUC)
  - “Make available for dispatch the lowest cost set of resources that will meet all the security requirements of the system”
  - Security = Reliability + policy/contractual constraints
  - Commitment cost = cost to start and have the generator run at no load
    - **SCUC sets up the system (tells which resources are needed)**
- Contrast to Security Constrained Economic Dispatch (SCED)
  - “Dispatch the set of available resources to satisfy all the security requirements of the system at the lowest marginal (total) price possible”
  - Start-up/no load costs are sunk – so what is the cost of the next cheapest MW that can be produced?
  - Dispatch cost = cost to produce the next MW
    - **SCED dispatches the set of resources that SCUC provided**
- **SCUC and SCED must iterate together many times to provide a “solution”**



# What does a BA do when not in a DAM?

- Bi-lateral Market
  - Day Ahead
    - Determine capacity needs (load forecast, sales, reserve req's, etc.)
    - Determine resources available to meet those needs
      - Economics begins to come into play
      - Resource constraints
      - Purchases vs using internal resources
        - Purchases typically “block” scheduled, few counter-parties
        - Lots of manual parts of the purchase process
      - Staggering starts to minimize cost but prep for future hour needs
      - Ex. BA suffers a forced outage of an internal, base-load NG combined-cycle plant and learns it won't return to service for 7 days. It may replace it with a combination of other, more expensive internal generation and bi-lateral purchases from other areas.
    - Optimization
      - Sophistication varies
      - Goal is to meet all needs in the cheapest way possible
        - Reliability, environmental, contractual obligations
        - Ability to “chase” the load (ex. duck curve)



# BA Area in a DA Market

- DA Market
  - Submit capacity needs to Market Operator (load forecast, sales, reserve req's, etc.)
  - Offer enough resources to meet at least its own needs + voluntarily offer extra
  - Inform the market of any resource constraints
    - Contractual, hydro restrictions, enviro hours, fuel supplies, outages, de-rates, etc.
  - Optimization (Combination of ALL loads and resources)
    - Now the gen stack can be evaluated across many BA's simultaneously
    - Take advantage of much wider regional diversity (weather fronts, time zone(s), etc.)
    - Wasted capacity can be utilized, minimize the natural over-commitment that occurs
    - Same Goal → meet all needs in the cheapest way possible
      - Reliability, environmental, contractual obligations
  - Ex. A BA with a forced generator outage offers its expensive peaking generator (showing it is resource sufficient), but the market is able to arrange to meet all the BA obligations without the need for that expensive generator.



# Increased Coordination in Day-ahead Operations

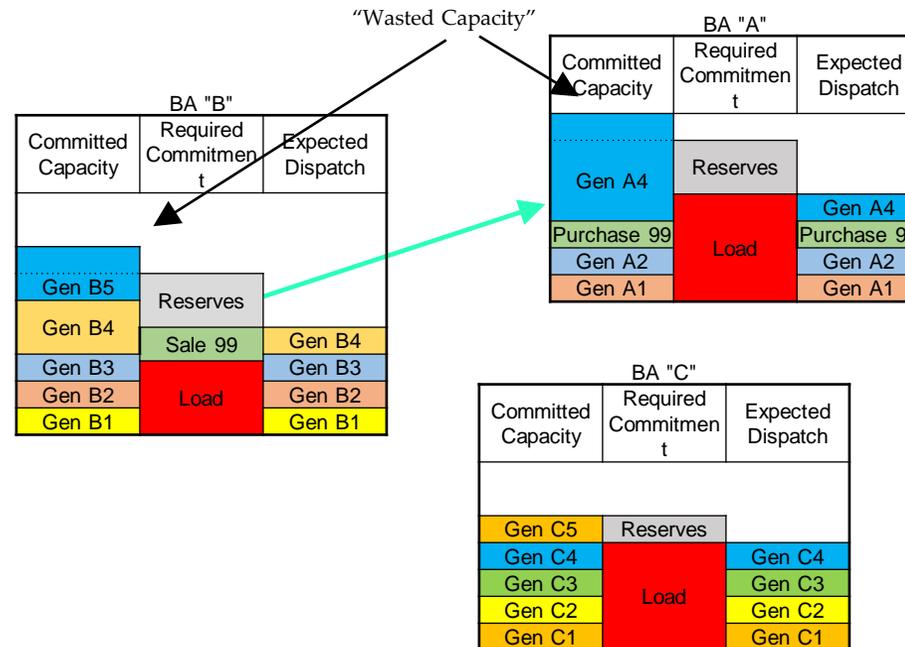
- In a non-coordinated market world...
  - Snapshot of a single hour

Not as a rule, but in general, BA's tend to leverage their own resources rather than make purchases.

Arranging purchases is complex, tends to have higher risk, and introduces additional accounting

There is some "wasted" excess capacity in one hour shown here.\*

\*Note: Excess capacity shown in one hour, may represent needed capacity to meet the next hour's increasing load.

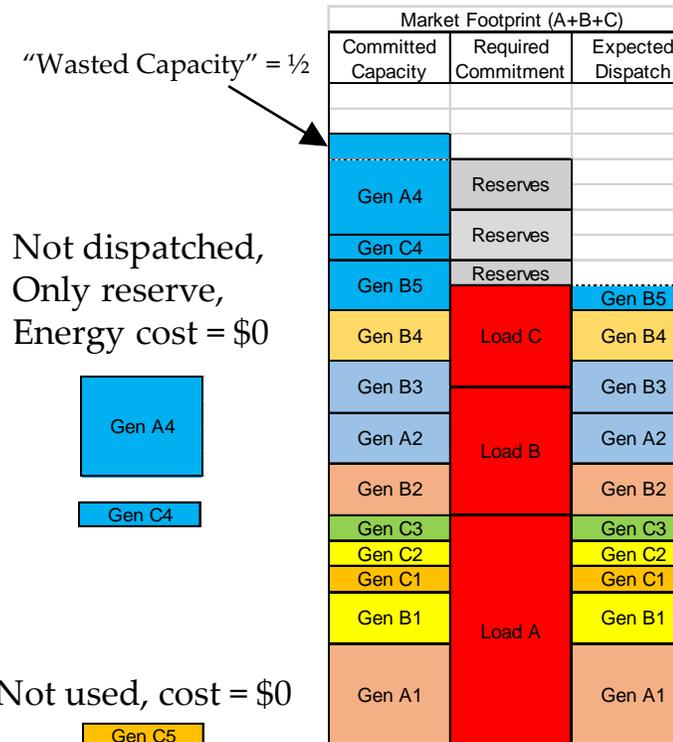


# Increased Coordination in Day-ahead Operations (cont.)

- In a coordinated market world...

- Snapshot of a single hour

- “Wasted” or excess capacity is  $\frac{1}{2}$  vs previous example. Reflected through the lack of commitment of Gen C5
- Combination of generation serving the combination of load from a balancing point of view
- Volume of “purchases” is greatly increased – facilitated automatically by the software/processes
- This combined commitment would then flow into the next hour “net load” and continue
- Analysing the commitment over several hours could reveal additional ability to leverage diversity types
- The generation stack in the combined commitment also reflects the relative cost of each generator across the footprint (foundation for the concept of Marginal Cost of Energy (MCOE) and Locational Marginal Price (LMP))
- Gen C4 and A4 have relatively high cost to run, so they will only be used if needed now as reserves only.
- Gen C5 seems to have the highest cost so was not even selected to be on standby.
- Not only is the consolidated commitment probably lower cost, it results in at least one less unit start – leading to a reliability benefit.

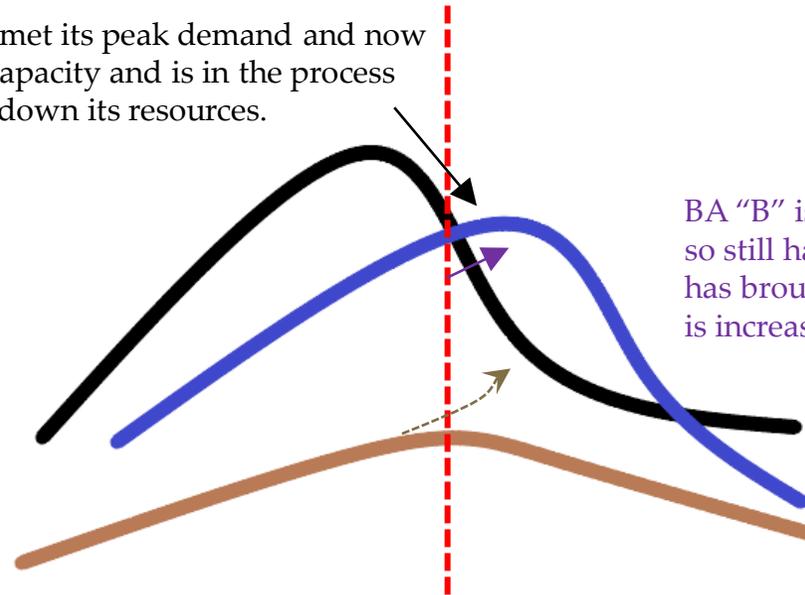


# Improved Response to Variability in Loads and Resources

## Example:

Net Demand  
BA "A"  
BA "B"  
BA "C"

BA "A" has met its peak demand and now has excess capacity and is in the process of ramping down its resources.



BA "B" is geographically west of BA "A" so still has an hour to go until peak and has brought another resource online and is increasing its output.

BA "C" is also at peak, but is curtailing its wind resources due to a weather front that is passing through its area. Its internal thermal resources cannot reduce output quickly enough.

Leveraging a combined commitment and dispatch across a wide-area could lead to an ability to serve the combined load with less resource "movement" and ability to use the existing fleet to respond to reliability needs in a more efficient manner.



# Managing and Integrating VER's

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- Combining commitment and analysing dispatch across a wide footprint can lead to an increased ability to integrate Variable Energy Resources, and also in a more reliable way.
- By aggregating forecasts across the wide-area in the day-ahead and utilizing the net dispatch of the system, dispatchable resources can also be held in reserve. Not only is this more efficient in terms of cost, but also enhances reliability by preserving dispatchable resources to respond to issues if they arise.
- Ex. Solar output decreasing in one area (net load increasing) can be supplemented by wind increasing in another (net load decreasing). This could lead to the decision to leverage a neighboring area's generation and avoid starting a thermal unit – thus leaving additional reserve available.



# Regional Diversity

- As a general rule, the larger the geographic area covered, the amount of diversity increases.
- For a given increase in number of resources, diversity benefit increases.
  - 100 small generators meeting the same load vs 1 large generator.
  - Reliability (generation contingencies, fuel supplies, ramping speed)
    - Ramp example: 2-20MW generators each with a 10 MW/minute ramp rate can achieve 40 MW in 20 minutes. A single 40 MW generator with the same 10 MW/minute ramp rate can only achieve 20 MW in the same time.
    - Fuel supply example: 2-20 MW generators separated by 200 miles are on separate gas supply lines.
    - Generation contingency example: 2-20 MW generators = 20 MW reserves (N-1). 1-40 MW generator = 40 MW reserves (N-1)
  - Weather, cloud cover, time zone, load type and shapes, generation types, etc.
    - Hydro (PNW), Solar (DSW), Wind (N and E), Gas (dispersed), etc.
    - Industrial vs suburban load, California vs Colorado peak time of day, NW → SE cold front passage, etc.



# Improved Transmission Congestion Management

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- Transmission usage
- Deliverability of generation from remote areas to other remote load
- Wider geographic coordination of the system dispatch
- Transparency in where bottlenecks and resource costs lie
  - LMP, MCOE, Marginal Loss Components, etc.



# Congestion Management Tools

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- CAISO uses Security Constrained Unit Commitment (SCUC) to:
  - “determines the Commitment Status and Day-Ahead schedules, AS Awards, RUC Awards, Hourly Intertie Block Schedules, FMM Schedules and Dispatch Instructions for selected resources and minimizes production costs (Start-Up, Minimum Load and Energy Bid Costs in IFM, and RTM; Start-Up, Minimum Load and RUC Availability Bid Costs) while respecting the physical operating characteristics of selected resources and Transmission Constraints” (CAISO BPM for Definitions and Acronyms)
- Bilateral BAAs similarly determine these schedules, but rarely simultaneously co-optimize



# Congestion Management Approaches

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- Flow based congestion management:
  - Commits and dispatches resources based on cost and subject to transmission limits, rather than pre-existing contracts
  - Uses system data to analyze the actual capability of the transmission system
  - To manage transmission constraints, CAISO commits and dispatches resources based on their contribution to the flows over the constraints
- Contract based congestion management:
  - Bases on contracts between generation and load, including firm and non-firm transmission right priorities
  - In operation, transmission capacity is limited by calculated limits based on anticipated operating conditions and system configuration designed to prevent SOL violations
  - The result is typically more manual intervention and can result in broader curtailments to management congestion than a flow-based method



# Reliability Benefits

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- More holistic view of the system to better view congestion and manage
  - In combining all day-ahead scheduling into one model, the combined model will have:
    - More supply options to meet demand (adequacy); and
    - A greater ability to withstand sudden, unexpected disturbances
  - A combined SCUC/operations model will have a more accurate system visualization (relative to the inaccurate contact path approach)
- Reliability benefits are similar to that which has resulted from the EIM, but on a larger scale because much more load is scheduled day-ahead
- Particularly over the long term, the use of LMP can have important reliability benefits by publicly and transparently communicating to the market where constraints exist and where investments are needed



# Example: loop flow

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- Loop flow exists because:
  - Two electrical substations are typically connected by more than one path
  - Electric power flows along the path of least resistance, rather than a defined contract path
  - Therefore, loop flow is the result of electric power flowing on a different route than was planned or expected based on transmission contract paths
- Currently, the WECC Unscheduled Flow Mitigation Plan (UFMP) governs loop flow management on major paths
  - UFMP is a complex procedure that relies on methods like phase shifting, manual processes, and energy tag curtailments to mitigate loop flow
  - Initiated when the transmission operator detects transmission congestion on a path
- Under a EDAM, loop flow is less likely to cause unexpected congestion as CAISO has a holistic view of the western interconnection, shift factors, and where the actual flows will go for any transmission service contract



# Example: seams management

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- Seams are inefficiencies or barriers between trading transmission regions because of different practices, rules, or procedures
- Seams can inhibit the economic transfer of capacity or energy
  - By inhibiting transfers, reliability can be adversely affected
- Forward congestion management is currently balkanized over many BAAs
  - In spreading the congestion management responsibility over many BAAs, the risk of miscommunication exists
  - An EDAM would consolidate the separate next day BAA congestion management authorities into a single entity (CAISO)
  - In doing so, because an EDAM would optimize over many BAs, seams will be greatly reduced
- But seams will still exist
  - There will still be neighboring BAA
  - Management and coordination of bilateral schedules will continue to be needed



# Conclusions

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Greater coordination across more BAs, more resources available for central commitment, and changes in the day-ahead commitment process (uniform application of advanced software) lead to potential reliability benefits:

1. **Increased Coordination in Day-ahead Operations:** Wider area view in the day ahead to identify potential reliability issues and coordinated use of more resources to address them aided by the application of sophisticated automated optimization.
2. **Improved Response to Variability in Loads and Resources:** Improved response to variability through increased coordination, diversity of resources and automated tools.
3. **Improved Transmission Congestion Management:** Improved congestion management and relaxed impact on seams between and among BAs resulting from more accurate calculations and use of transmission system through system-wide flow based modeling and locational marginal pricing-based optimization.



# Contacts

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- Jason Smith, Director of Transmission, Orsted  
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- Dillon Kolkmann, Energy Industry Analyst, Office of Energy Policy and Innovation, FERC  
[Dillon.Kolkmann@ferc.gov](mailto:Dillon.Kolkmann@ferc.gov)
- *Reliability Implications of Expanding the EIM to Include Day-Ahead Market Services: A Qualitative Assessment* [[pdf](#)]



# MIC Working Group

Harnessing Membership Expertise in Partnership with Outside Experts

	Organization
Robert Follini	Avista, Co-lead
Alaine Ginocchio	WIRAB, Co-lead
Andrew Meyers	Bonneville Power Administration
Darren Lamb	California ISO
Jamie Austin	PacifiCorp
Charles Faust	WAPA, Sierra Nevada Region
Jason Smith	Xcel Energy
Angela Amos	FERC, OEMR
Ben Foster	FERC, OEPI
Dillon Kolkman	FERC, OEPI
Jomo Richardson	FERC, OER
Monica Taba	FERC, OER
Layne Brown	WECC
Jennifer Gardner/Vijay Satyal	Western Resource Advocates



# Upcoming Meetings

## WIRAB Monthly Teleconference Meeting

First Thursday of every month at 11:00 AM MT

**Next Meeting: November 5, 2020 at 11:00 AM MT**

## Fall 2020 Joint CREPC-WIRAB Meeting

Virtual panel sessions begin October 23, 2020

Announcement and registration information available soon





# Thank You

Maury Galbraith

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