NorthWestern Energy
Balancing Authority Operations

Our Customer Transmission Capacity and

Balancing Authority Overview - Basic Responsibilities WECC Balancing Authorities

Who Do We Serve? NorthWestern Customers

- Retail Customers (Energy Supply and Delivery) - end-use customers taking bundled retail electric service under rates regulated by the Montana Public Service
- NorthWestern provides Transmission Service to 28 Network Customers under Section III of the OATT -
    - 5 of these Network Customer's are Cooperatives
        - Basin Electric Cooperative, Bonneville Power Administration, Big Horn Electric Cooperative, Beartooth Electric Cooperative, and WAPA
    - Unbundled retail customers that, under Montana's deregulation statute, purchase electric commodity service from a competitive electricity supplier of their choice - Choice Customers
    - These customers represent about 1/3 of the NorthWestern Energy Balancing Authority Load

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NorthWestern Customers

- NorthWestern provides Transmission Service to approximately 80 Point to Point customer's under Section II of the OATT.
  - These customers are independent generators and marketers that utilize NorthWestern's Transmission System
- Generator Interconnection Customers

- Important Note: all Firm Customers are Treated with same Level of Priority for Transmission Service.

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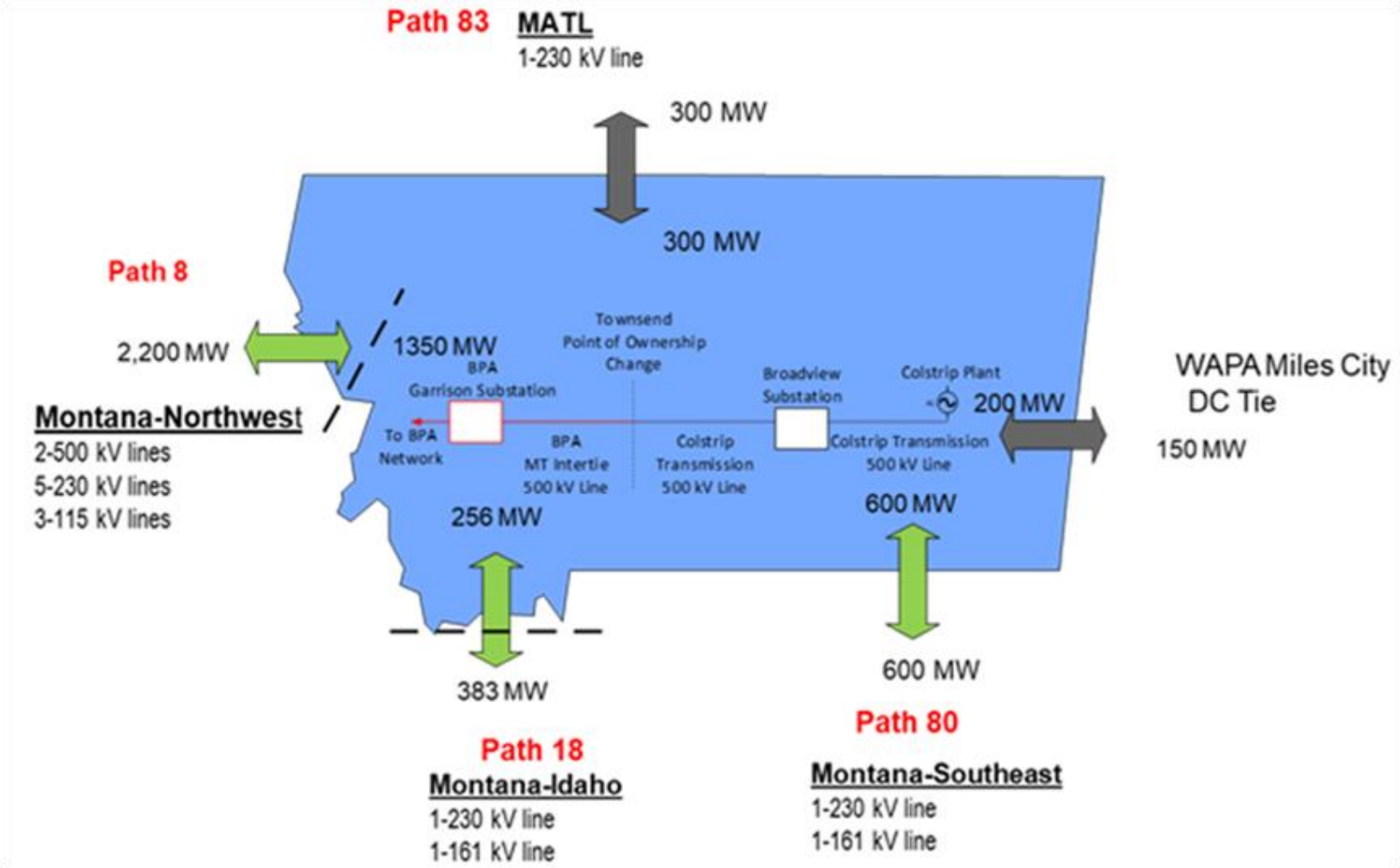
Transmission Capacity is Limited

Total Transmission Capacity - TTC



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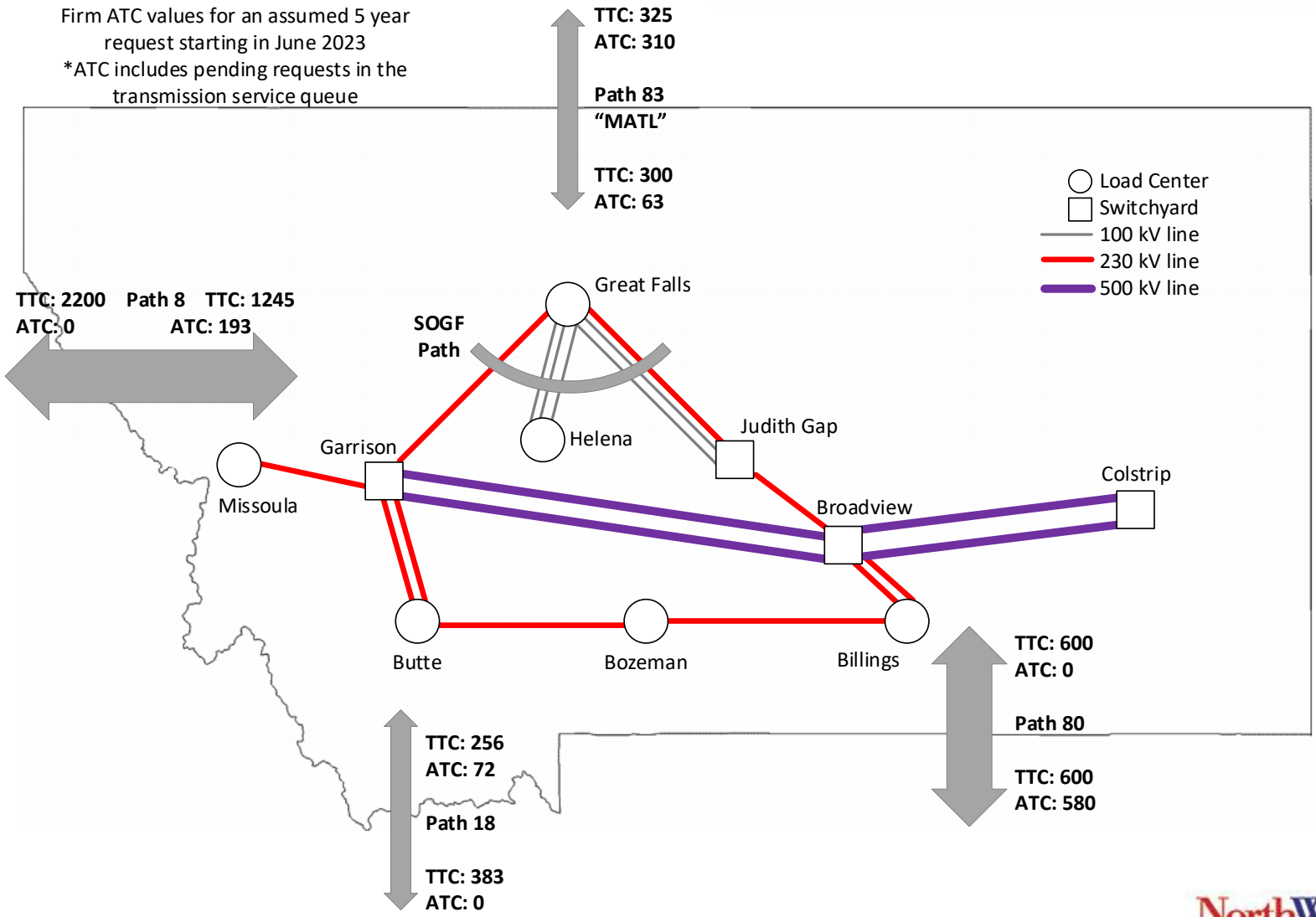
Available Transmission Capacity (ATC) is Limited



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What Is A Balancing Authority (BA)?

- A Balancing Authority is defined by a set of resources and interchange meters.
  - Interchange – is exchange of resources from outside of the BA
- Traditional Balancing Authorities have dispatchable generation, load, and interchange.
- Resource Adequacy is essential to BA Operations as well as Energy Supply to our Customers

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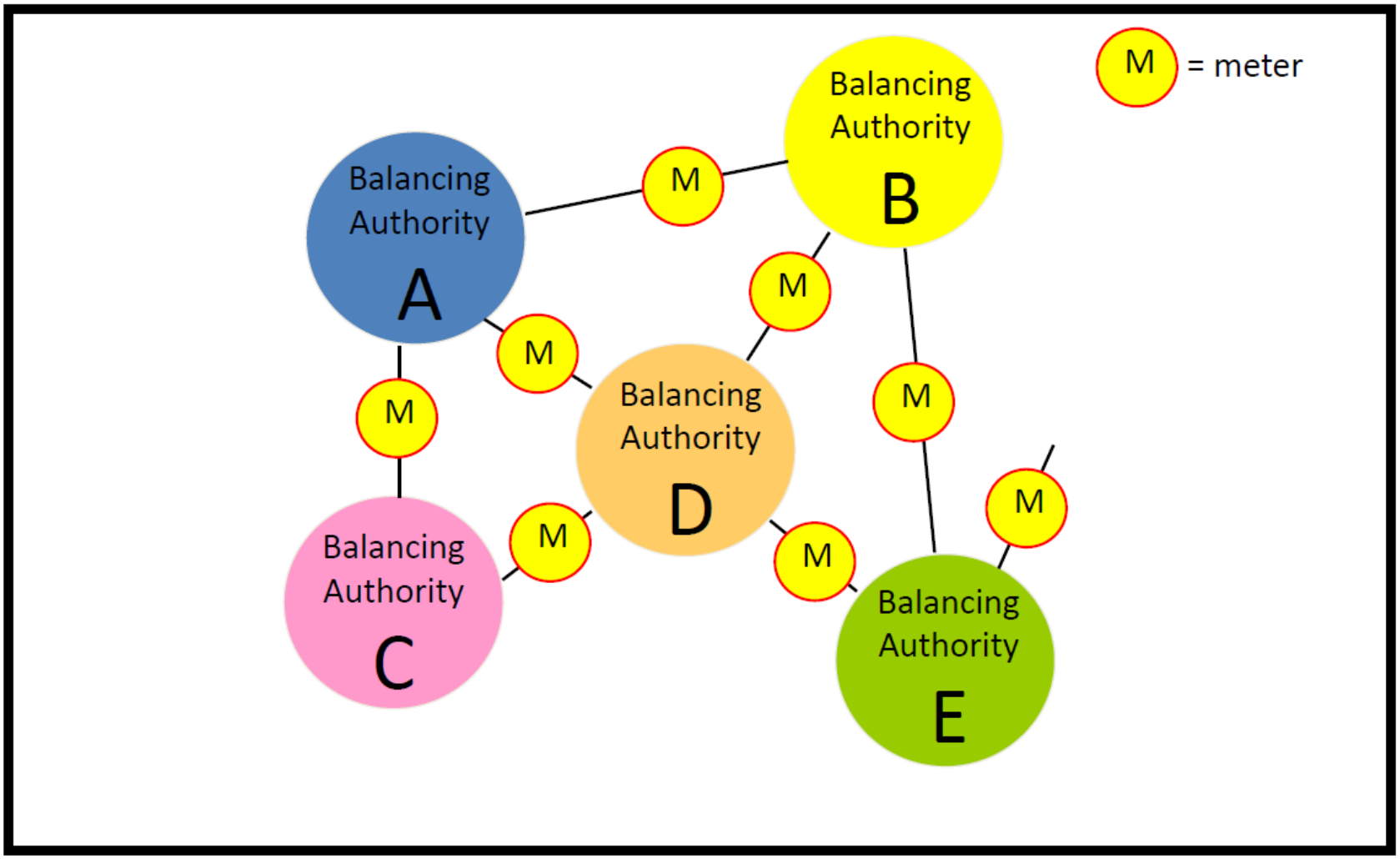
Balancing Authorities



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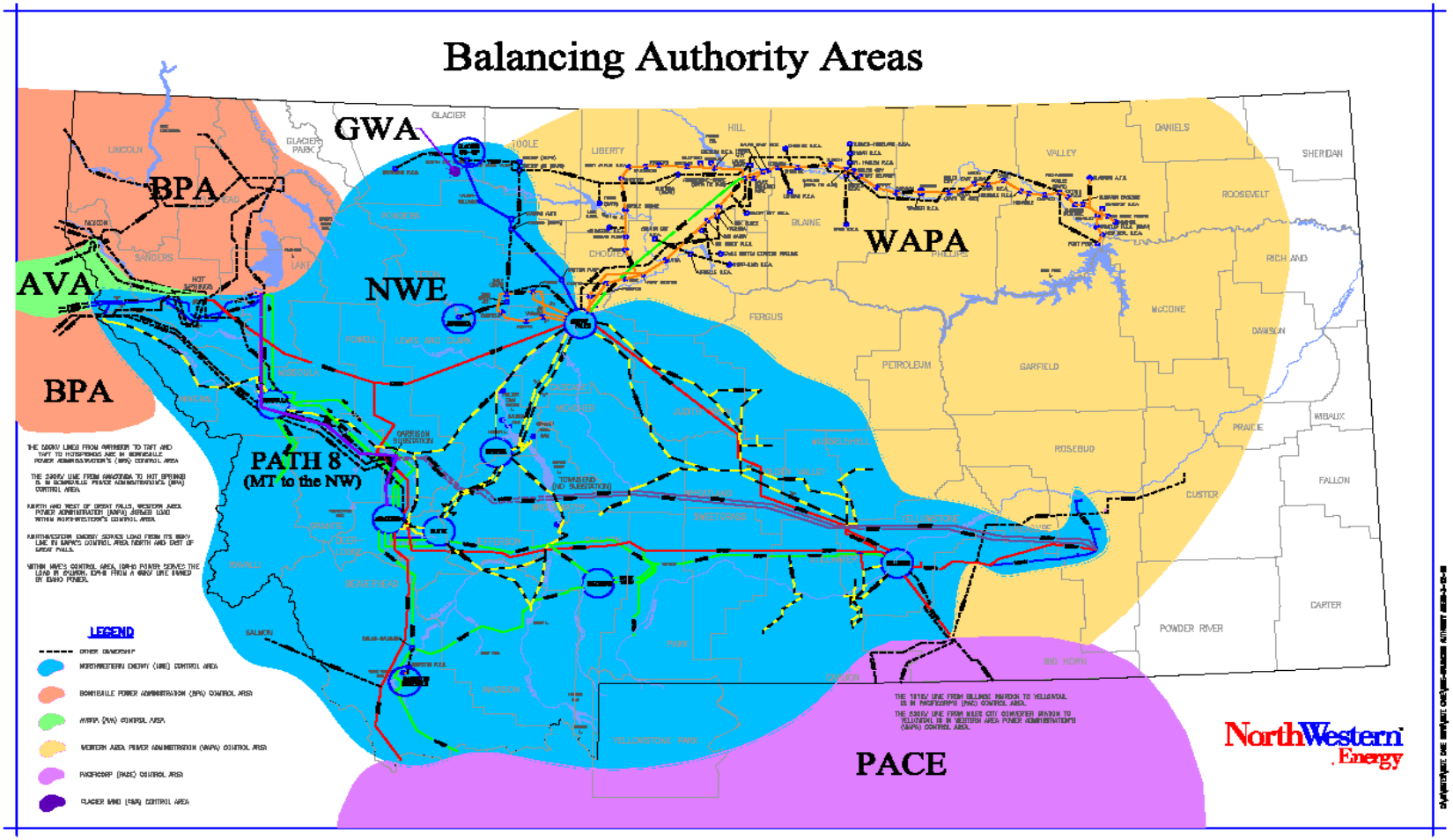
NorthWestern and Adjacent Balancing Authorities



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Why Balancing Authorities Are Needed:

- Load and Generation Balancing
- Required for good control of frequency
- Implement Interchange Transactions
- NERC Reliability Criteria
  - Mandatory Compliance
  - Civil Penalties for non-compliance

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Generation and Demand Balance Concepts

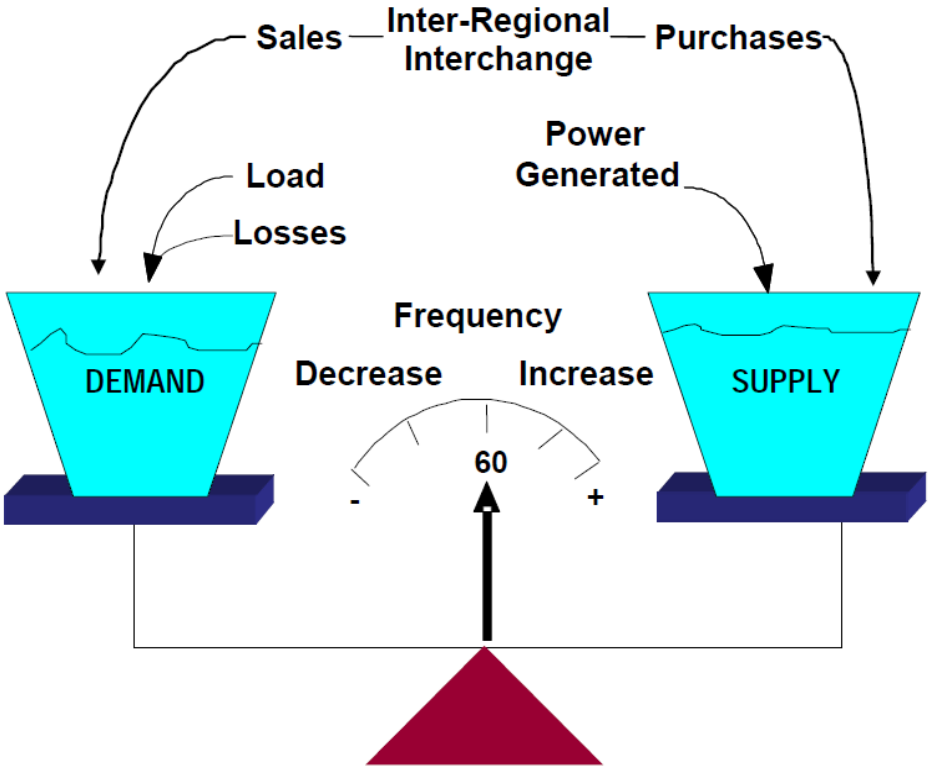

Figure 3a — Generation / Demand Balance

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Balancing Authority Performance Measurable

Control Performance Standard 1 (CPS1)

- CPS1 assigns each Balancing Authority a share of the responsibility for control of steady-state Interconnection frequency. **Higher Percentage = Better BA Performance.**

Balancing Authority ACE Limit (BAAL) –

- Each Balancing Authority shall operate such that its clock-minute average of Reporting ACE does not exceed its clock-minute Balancing Authority ACE Limit (BAAL) for more than 30 consecutive clock-minutes. **Less BAAL exceedances = Better BA Performance**

Inadvertent Interchange

- is net imbalance of energy between a Balancing Authority and the Interconnection. The formula for Inadvertent Interchange is: **NII = NIA – NIS. Less Inadvertent Interchange = Better BA Performance**

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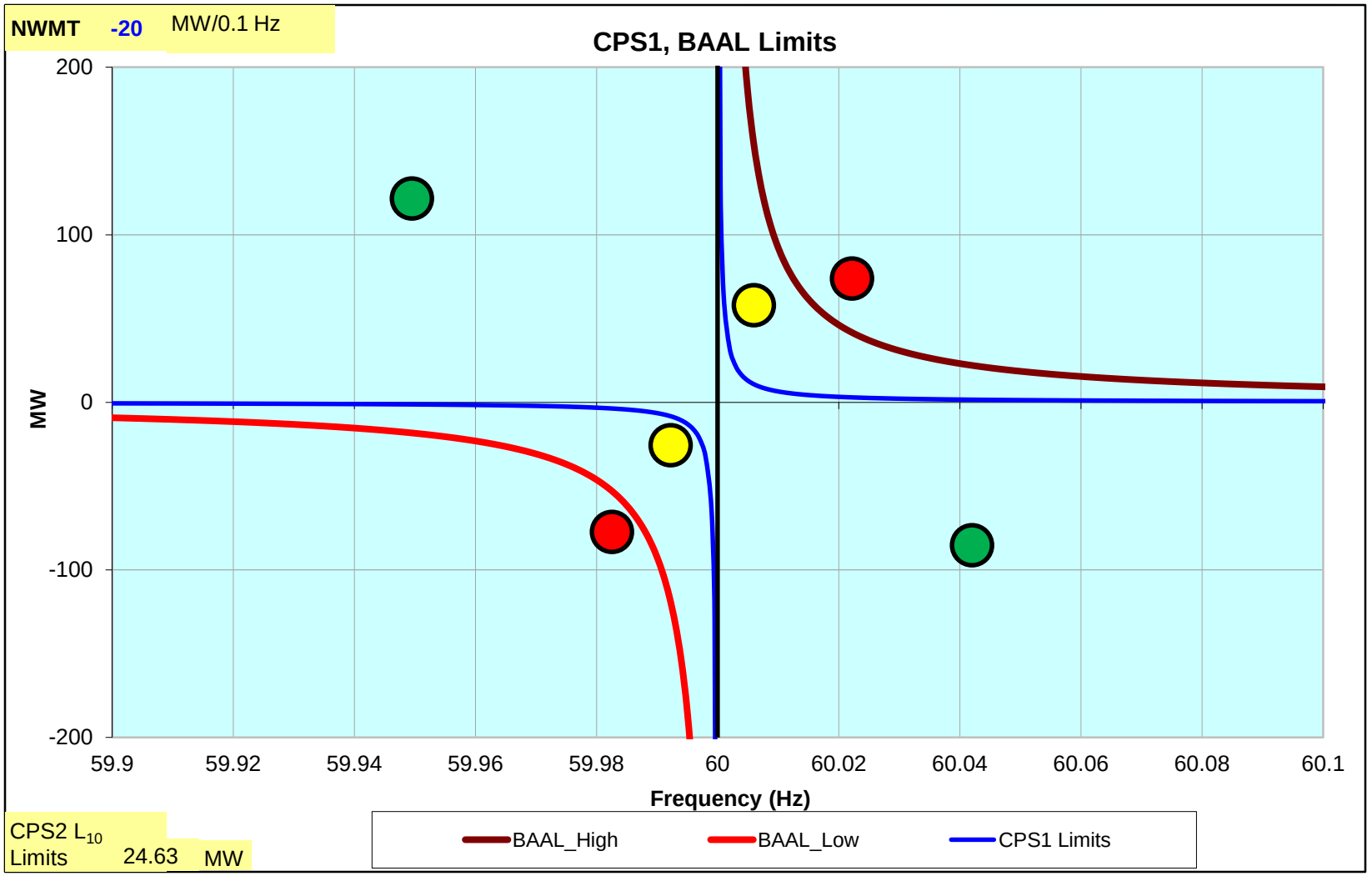
NorthWestern Energy BAAL & CPS1 Limits

BAL-001-2 Limits

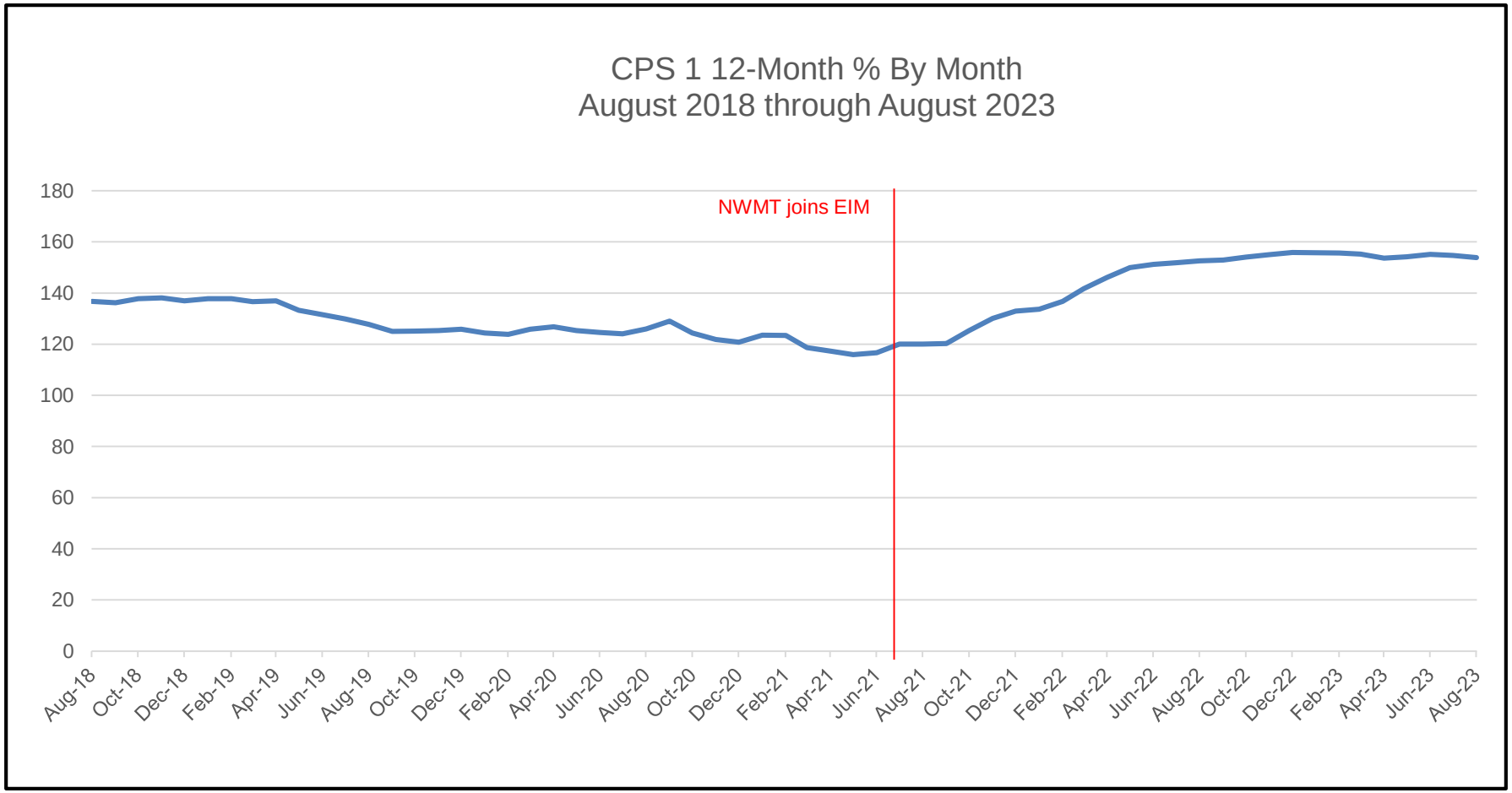


Balancing Authority & EIM Overview

In general, NorthWestern Energy Western EIM Participation has improved operations

- ACE has been closer to zero which improves performance measurables
- Market transfers provide additional flexibility in most hours
- EIM Market target attempts to create zero ACE every 5 minutes on a 10-minute future forecast basis. This equates to a 15 minute response time for ACE adjustment
- Regulation provides real-time balance and ACE adjustment
- EIM aids Balancing Authority performance for BAAL, CPS1, Frequency Response

CPS1 Performance, Pre and Post EIM



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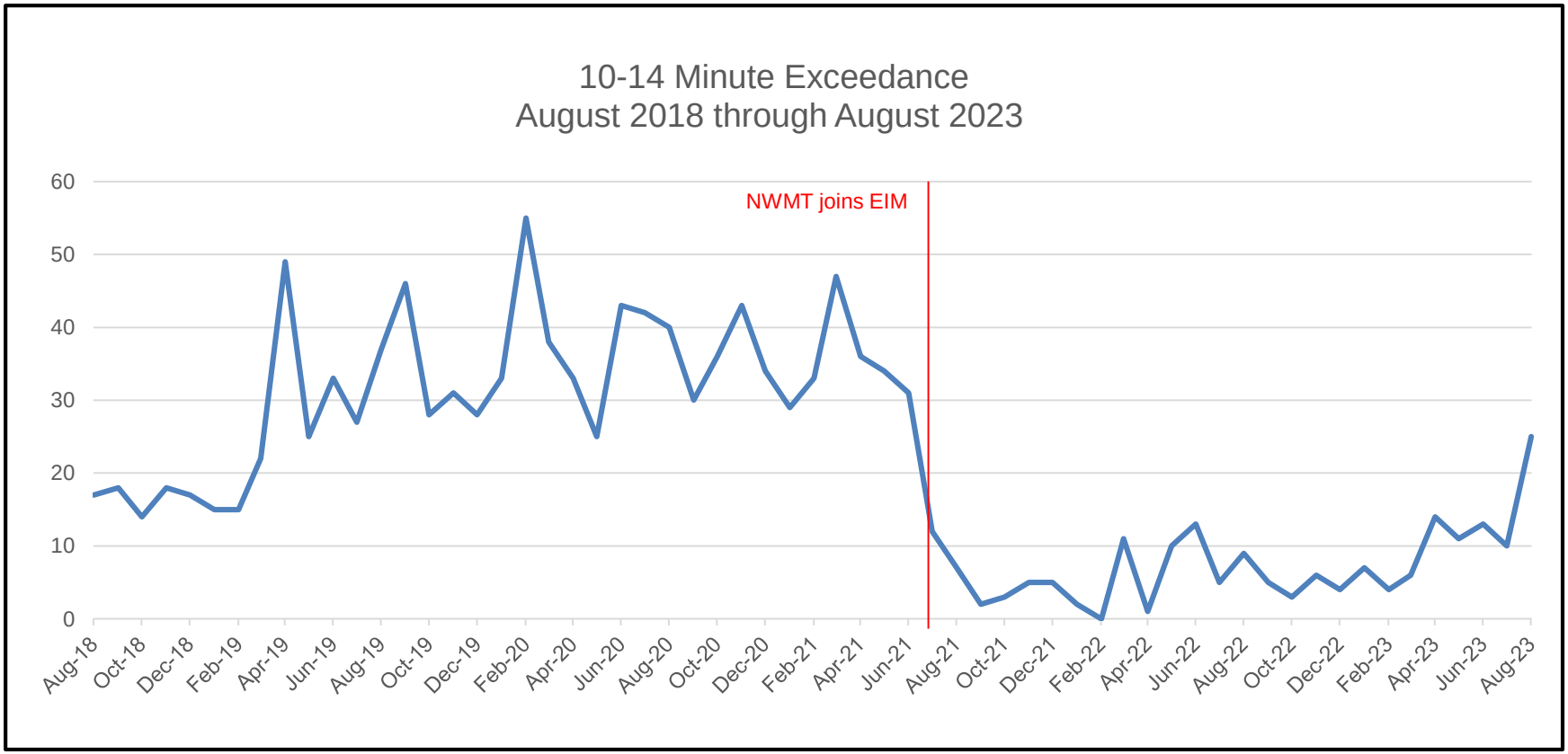
BAAL Exceedances, Pre & Post EIM Participation



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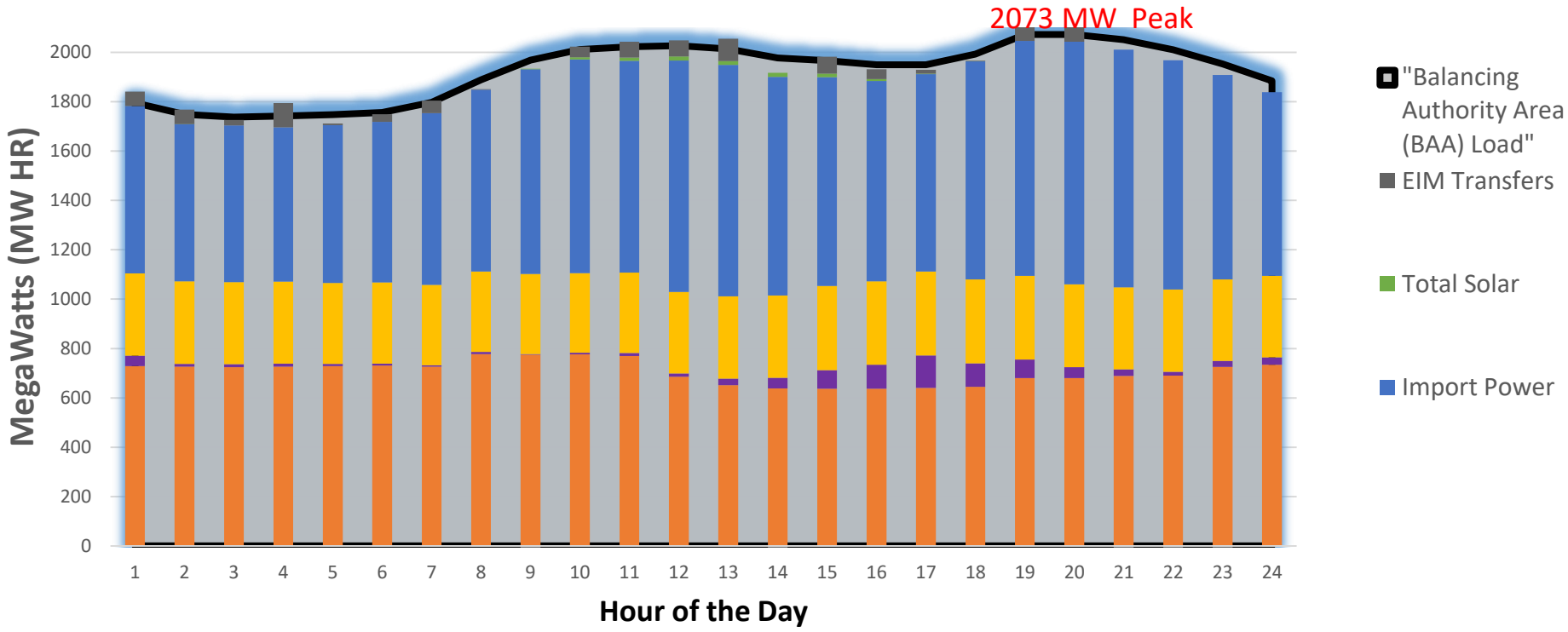
Peak Load Event
December 22, 2022

Actual BA Load – December 22, 2022

Balancing Authority Needs by Hour Based on Loads - 12/22/2022



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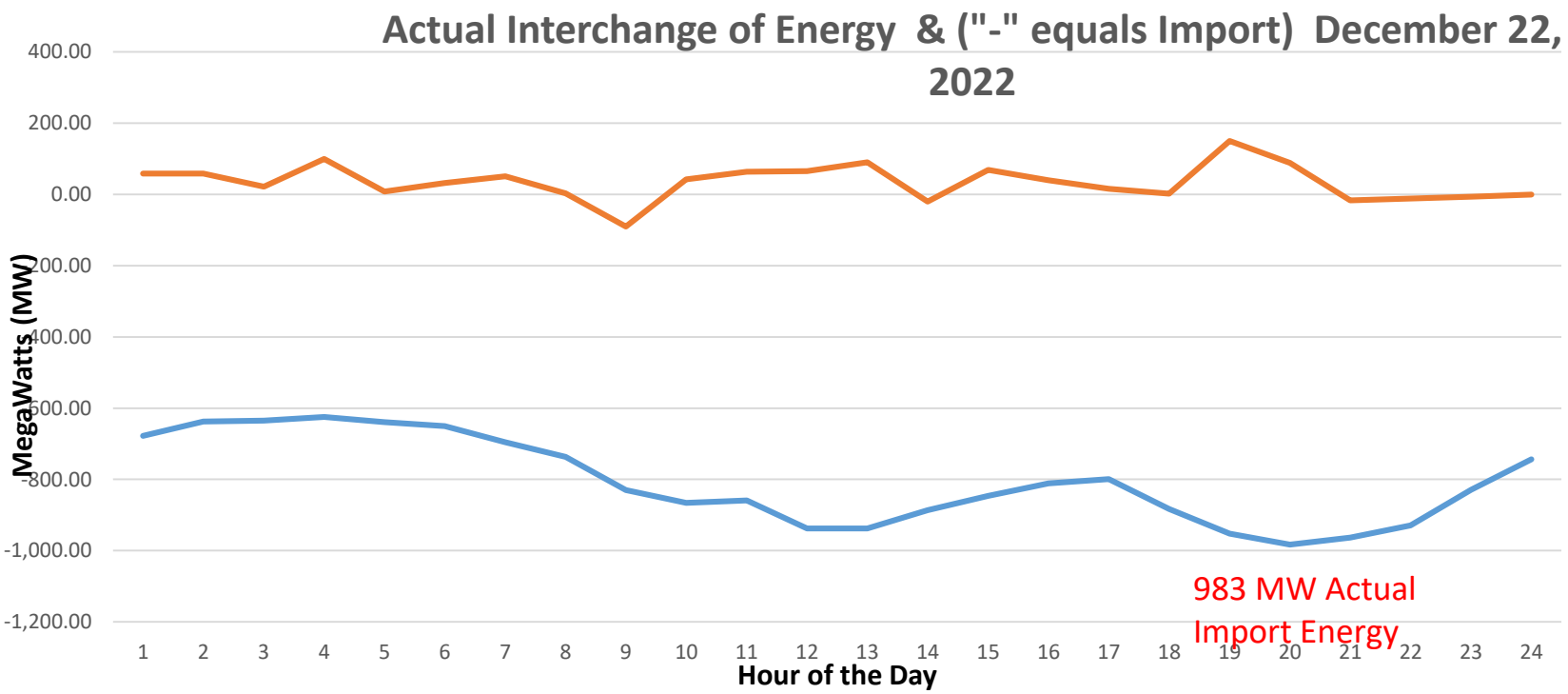
Import Energy During Peak Load



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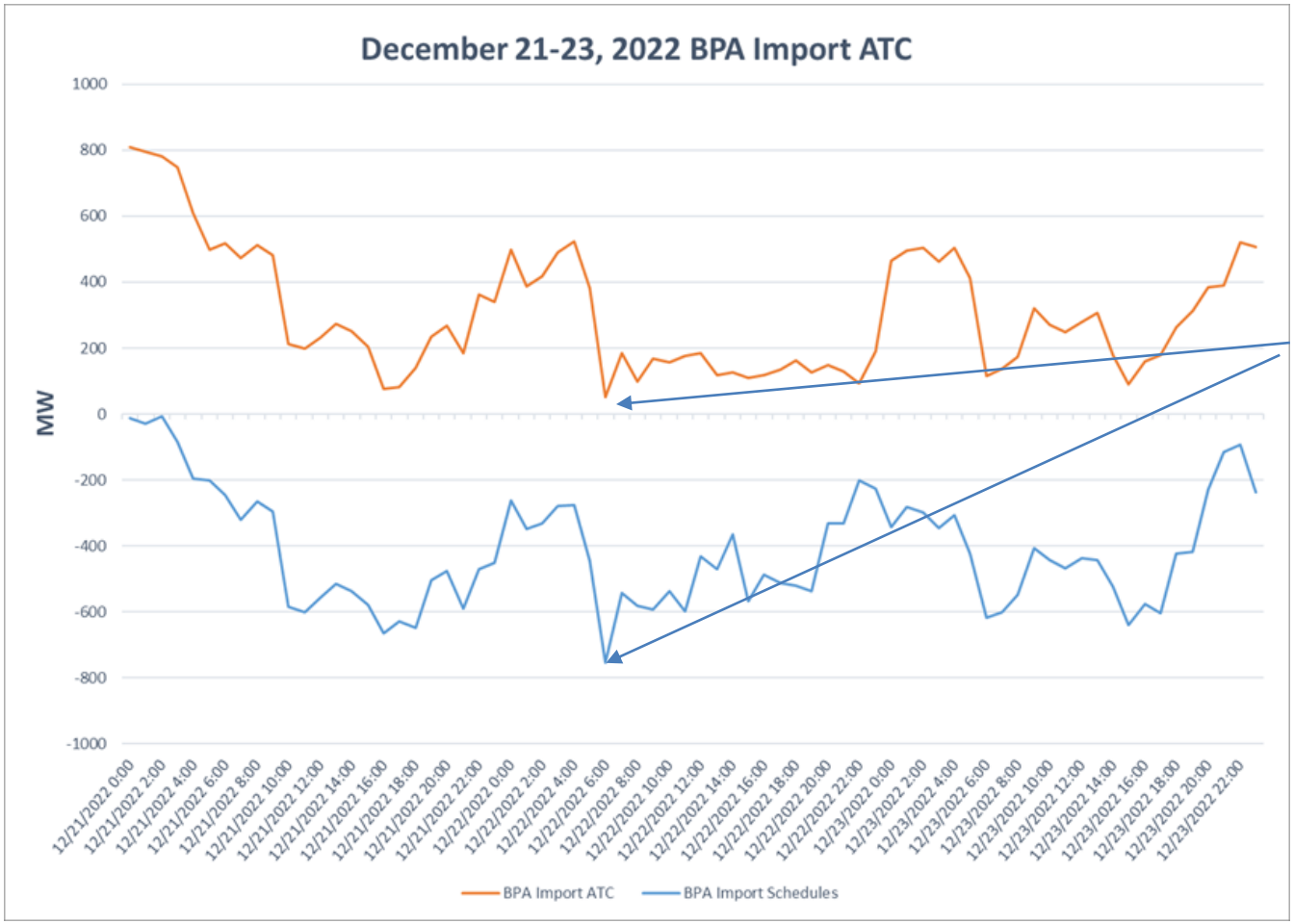
Import Energy During Peak Load



During coldest hours on 12/22/22, NorthWestern experienced curtailments on Path 18, Path 80 and Path 83 putting great reliance on Path 8 from BPA

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What Should We Take Away from Today's Discussion?

Thoughts on Resource Adequacy and BA Operations

- What happens when there is a contingency?
  - OATT assumes Resource Adequacy is in place – curtailment process for contingencies
- What do you do if load outstrips available resources?
  - Western Resource Adequacy Program (WRAP) – assures adequate resources plus reserve margin for Participating Entities
  - Participation is voluntary at this point
  - NorthWestern is Participating on behalf of its Retail Customers – first binding season of WRAP is Summer 2026
  - Not all BA Load participating
  - Absent Participation in WRAP, Tools at the BA disposal to solve energy supply issues are limited (Energy Emergency Process)
- Separate effort has been undertaken to identify “critical loads” if curtailment under OATT is required
- Post-event consequences?

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Delivering a **bright future**

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