

# MARKETS



Denver, CO Meeting

June 1, 2022



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keep the lights on today and in the future.*



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**WESTERN  
ENERGY  
SERVICES**

# WELCOME AND OVERVIEW

BRUCE REW

SPP SR. VP, OPERATIONS

# AGENDA – JUNE 1

8:30-9:30	General Session I – Design Team Updates
9:30-10:00	Break
10:00-11:00	General Session II – Market Monitor Panel
11:00-12:30	General Session III – Transmission Topics
12:30-1:30	Lunch
1:30-3:00	Breakout Sessions Governance Design Team (Room: HQ-101) Joint Transmission and Market Design Teams
3:00-3:30	Break
3:30-5:00	General Session IV – Congestion Rent Allocation
5:30-6:30	Reception – Double Tree Hotel

# GENERAL SESSION I DESIGN TEAM UPDATES

# AGENDA – GENERAL SESSION I

## DESIGN TEAM UPDATES

Opening Remarks	Barbara Sugg
Participants Introductions	
SPP's Vision for Western Markets	Bruce Rew
Governance Design Team Update	Kara Fornstrom
Transmission Availability Design Team Update	Steve Johnson
Market Products/Price Formation Design Team Update	Jim Gonzalez
GHG Tracking Update	Kara Fornstrom
Market Monitoring Update	Kara Fornstrom
Meeting Goals and Expectations	Bruce Rew

# OPENING REMARKS

BARBARA SUGG  
SPP CHIEF EXECUTIVE OFFICER

# PARTICIPANTS INTRODUCTION

# SPP'S VISION FOR WESTERN MARKETS

BRUCE REW

SPP SR. VP, OPERATIONS





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## RTO West

- 7 organizations joining RTO in 2024; expected \$49M annual savings for new & existing members

## Western Energy Imbalance Service (WEIS) Market

- Launched Feb. 2021; 3 new members joining in 2023 bringing load to 13.5GW

## Markets+

- New real-time/day-ahead market in development with western parties (will replace WEIS)

## Western Reliability Coordination Service

- Maintaining reliability for 13 western transmission operators

## Western Interconnection Unscheduled Flow Mitigation Plan

- Helping western organizations manage grid congestion

## Western Resource Adequacy Program Operator

- Partnering with Western Power Pool to ensure resource adequacy

Achieve  
clean  
energy  
goals

Reinforce  
system  
reliability

Provide  
economic  
benefits

New  
opportunities  
to trade low-  
cost power

Maintain  
resource  
adequacy



# SPP'S MARKETS VISION

- WEIS continues for period of time
  - Imbalance market a great introduction to markets
  - Short-term solution for market participants
- RTO development
  - Provides long-term solution to market needs
  - Consolidated BA, Regional Planning, Unit Commitment
- Markets+ development
  - Possible long-term solution to meet some market needs

# 2022 MARKETS+ GOAL AND SCHEDULE

- Draft Service Offering – End of September
  - Written Comment Period
- Final Service Offering – Mid-November
  - Will Not Include: Market Protocols and Tariff Language
- Commitment to Investigate – Q1 2023
  - Financially Binding to Scope Implementation
- Stakeholder Process to Develop Market Protocols and Tariff Language
- Participant Agreement Execution – Fund Implementation

# GOVERNANCE DESIGN TEAM UPDATE

KARA FORNSTROM, SPP

# GOVERNANCE DESIGN TEAM

## STAKEHOLDER LEADS

Aly Koslow	Director, Federal Regulatory Affairs and Compliance	Arizona Public Service
David Rubin	Federal Energy Policy Director	NV Energy
Joe Fina	Assistant General Counsel	Snohomish County Public Utility District No. 1
Lea Fisher	Senior Policy Analyst	Public Generating Pool

## SPP Support Team

Paul Suskie	General Counsel & EVP Regulatory Policy
Kara Fornstrom	Director, State Regulatory Policy
Mike Riley	Associate General Counsel
Britney Lloyd	Attorney
Nicole Wagner	Manager, Regulatory Policy
Patti Kelly	Lead Regulatory Analyst

# GOVERNANCE DESIGN TEAM ACTIVITY

- March 29-30      Developed Matrices for Governance Options
- April 1            Issued Request for Written Comments
- April 13          WIEB Webinar I – State Representatives
- April 20          Written Comments were Due
- April 25          SPP Webinar – Summary of Written Comments
- May 13            WIEB Webinar II – State Representatives
- May 23            SPP Webinar – Overview of Governance Straw Proposal  
SPP Issued Governance Straw Proposal

# STRAW PROPOSAL – BALANCING INTERESTS

- Include consensus views from meetings and written comment responses to the maximum extent possible
- What FERC will approve
- SPP best practices
- Minimize impacts to SPP, Inc.



# GROUP CATEGORIES - DEFINITIONS

## Markets+ Market Participant (MMP)

- Executed Participant Agreement
- Contributes generation and/or load to market

## Markets+ Market Stakeholder (MMS)

- Executed Stakeholder Agreement
- Does not contribute generation or load
- Voting rights: MIP Selection Forum
  - Eligible for voting seat on MIP Nominating Committee, Working Groups & Task Forces
- Annual fee of \$5,000

## Markets+ Non-Voting Stakeholder (MNVS)

- Provide input at all stakeholder meetings
- No voting rights
- No annual fee





# GOVERNANCE DESIGN TEAM FUTURE MEETINGS

- Webinar: June 24 10:00 am – Noon Mountain
- Webinar: July 22 10:00 am – Noon Mountain

\*April 25<sup>th</sup> Webinar Slide Deck Updated and Posted

# QUESTIONS/DISCUSSION

# TRANSMISSION AVAILABILITY DESIGN TEAM UPDATE

STEVE JOHNSON, SPP

# TRANSMISSION AVAILABILITY TEAM

STAKEHOLDER LEADS		
Joe Taylor	Manager, Transmission Access	Xcel Energy
Chris Hofmann	Director Transmission & Generation Operations	Salt River Project
Mike Linn	Director, Market Analytics	Public Power Council
Bri Allen	Regional and Market Initiatives Lead	Bonneville Power Administration

SPP Support Team	
Steve Johnson	Principal Operations Specialist
Hamilton Bitely	Senior Operations Analyst
Shari Brown	Manager, Tariff Administration

# TRANSMISSION AVAILABILITY DESIGN TEAM ACTIVITY

- **March 29-30 Phoenix Meetings**
  - Flow-based Operations in a Path Based World
  - Joint: Base Schedules
  - Joint: Congestion Rents
  - General Session: Seams
- **April 13 Webinar**
  - Market Efficiency Use
  - ATRR Recovery
- **May 11 Webinar**
  - Powerex Presentation
  - Initial Data Results
  - Revenue Recovery Proposals

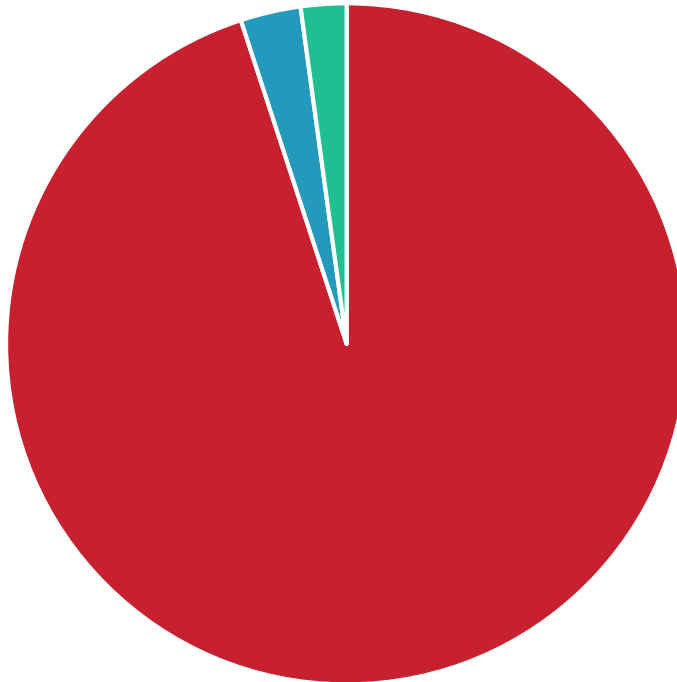
# TRANSMISSION DATA

- Nine Companies Provided Initial ATRR Data
  - Arizona Public Service
  - Avista
  - Bonneville Power Administration
  - Grant County PUD
  - Idaho Power
  - Portland General Electric
  - Public Service Colorado
  - Salt River Project
  - Tacoma Power
- Two others provided partial data (not currently included in charts)
  - Northwestern Energy
  - Puget Sound Energy

# TRANSMISSION DATA

\$2.21B total ATRR  
\$66.7M STF (3%)  
\$50.4M NF (2%)

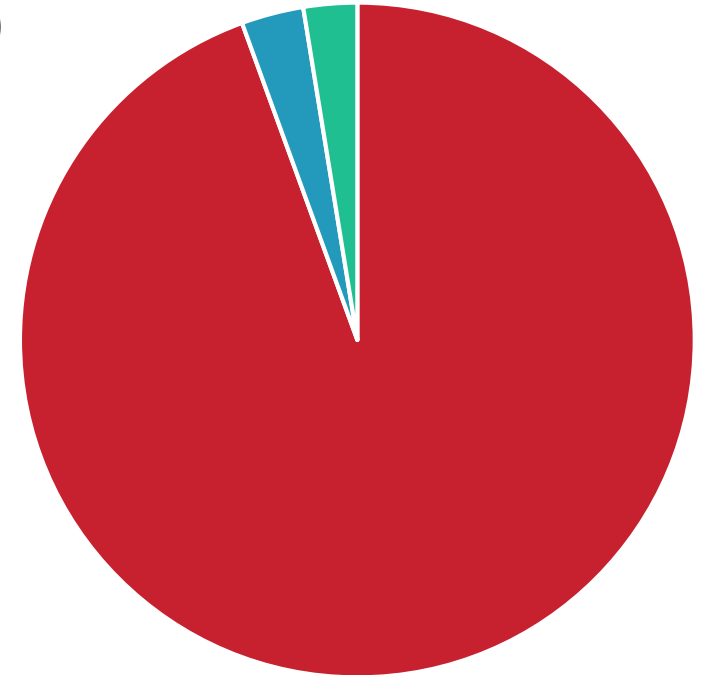
2020 ATRR Data



■ Total ATRR ■ Total STF ■ Total NF

\$1.2B ATRR w/o BPA  
\$38M STF (3%)  
\$32.7M NF (3%)

2020 ATRR Data Less BPA



■ Total ATRR ■ Total STF ■ Total NF



# TADT DASHBOARD

Revenue Recovery Amount

Revenue Recovery mechanism (load vs. market based)

Revenue distribution methodology

All transmission in, out by exception






TSP data collection and analysis

Working draft of design document

TSP and Planning functions retained, OATT rights respected

Base Schedule support

Flow-based operations DA and RT

-  Ongoing Discussions
-  In Process
-  General Agreement
-  Ready for comment
-  Ready for Offering

# TRANSMISSION AVAILABILITY DESIGN TEAM FUTURE WEBINARS

- June 15                      10:00 am – Noon Mountain
- June 29                      10:00 am – Noon Mountain
- July 20                        10:00 am – Noon Mountain
- August 3                      10:00 am – Noon Mountain

# QUESTIONS/DISCUSSION

# MARKET PRODUCTS PRICE FORMATION DESIGN TEAM UPDATE

JIM GONZALEZ, SPP

# MARKET PRODUCTS AND PRICE FORMATION DESIGN TEAM

STAKEHOLDER LEADS		
Jeff Spires	Director, Power	Powerex
Carrie Simpson	Director, Western Markets	Xcel Energy
Brian Cole	General Manager, Resource Management	Arizona Public Service
Laura Trolese	Senior Market Design & Policy Advisor	The Energy Authority
Russ Mantifel	Director of Market Initiatives	Bonneville Power Administration

SPP Support Team	
Jim Gonzalez	Manager, Real Time Markets
Micha Bailey	Supervisor, Congesting Hedging

# MP/PF DESIGN TEAM ACTIVITY

- **March 29-30 Phoenix Discussions**
  - Understanding Markets
  - Joint Session: Base Schedules
  - Joint Session: Congestion Rents
  - General Session: Seams
- **April 26 Webinar**
  - Day-Ahead Timeline Survey Report
  - High-level Market Objectives and Timelines
  - Ensuring Physical Capacity
  - Flexible Reserve/Market Product
  - Unit Commitment
- **May 17 Webinar**
  - Progress Scorecard and Proposal/Comment Cycle
  - Pricing Presentation
  - Resource Adequacy/Resource Sufficiency

# MARKETS+ MARKET DESIGN

## Regional Cost Savings

- **Commit Least Cost** Fleet of Resources cable of meeting reliability needs
- **Minimize Production Cost** of generating resources serving net obligation
- **Maximize Capabilities** of Transmission System

## How?






- **Centralize Unit Commitment** in Day-Ahead
- **Centralized Dispatch** in Real-time
- **Flow-based** Congestion Management

## Market Design Mechanics

- **Transparency**
  - Pricing
  - Market Operations
- **Equitable Treatment**
  - Cost-causation for 'who pays'
  - Comprehensive, net-settlement
- **Compatible** with existing constructs
  - Recognize rights and investment in transmission system
  - Bilateral Transactions

# DECISION SCORECARD – PHOENIX (03/30/2022)






Market Timelines	Losses	Congestion Hedge	Market Products
Congestion Management	Dispatch	Unit Commitment	Physical Sufficiency
Uplifts	Bilateral Transactions	Physical Deliverability	Mitigation
Participation Models	Price Formation	Virtuals	GHG/Carb

-  Ongoing Discussions
-  Future Discussion
-  Nearing Comment Form
-  Comment Form Out
-  Ready for Offering



# DECISION SCORECARD CURRENT

Market Timelines	Losses	Congestion Hedge	Market Products
Congestion Management	Dispatch	Unit Commitment	Physical Sufficiency
Uplifts	Bilateral Transactions	Physical Deliverability	Mitigation
Participation Models	Price Formation	Virtuals	GHG/Carb

-  Ongoing Discussions
-  Future Discussion
-  Nearing Comment Form
-  Comment Form Out
-  Ready for Offering

# PRELIMINARY COMMENT FORM

- SPP and Industry Leads want to solicit feedback from participants
- Focused form for each 'Decision Box'
  - 2-3 week turnaround
  - Not last chance to comment
  - Contains questions and background to help with feedback
- More to come

# LAST MEETING - PRICE FORMATION OVERVIEW

- Purpose is to discuss concepts at a higher level, with more detailed design sessions when necessary
- General Pricing Concepts
  - Locational Marginal Pricing
  - Ex-Ante vs Ex-Post
  - Product Pricing and Scarcity
  - Co-optimization
  - Fast Start
  - Transparency and Accuracy

# PRICE FORMATION NEXT STEPS

- Schedule focused, technical deep dives:
  - Co-optimization
  - Fast Start Pricing
  - Convergence Bidding (Virtuals)

# MP/PF DESIGN TEAM FUTURE MEETINGS

- Webinar: June 28, 2022      9:00-11:00 Mountain
  - Targeting July for price formation deep dive meetings
  
- Webinar: July 19, 2022      9:00-11:00 Mountain

# QUESTIONS/DISCUSSION

# GHG TRACKING UPDATE

KARA FORNSTROM, SPP

# GHG DESIGN ELEMENT

- Leverage existing work by numerous parties in the West
- Invitations to Present Concepts
  - April 20: 11:00-1:00 (Pacific)
  - May 17: 11:00-1:00 (Pacific)
- Denver Meeting: June 2<sup>nd</sup> General Session
- Written Comment Opportunity



# QUESTIONS/DISCUSSION

# MARKET MONITORING

KARA FORNSTROM, SPP

# MARKET MONITORING – UPDATE SLIDE

- SPP Webinar – April
  - Presentation by Barbara Stroope, Ph.D., Manager, Day-Ahead Markets
- Denver Meeting: June 1<sup>st</sup> General Session
- Written Comment Opportunity – June 17
  - Comments Due July 15

# QUESTIONS/DISCUSSION

# MEETING GOALS AND EXPECTATIONS

BRUCE REW



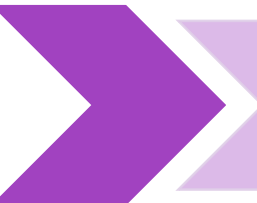
Foster engaging discussions



Understand and give voice to diverse perspectives



Develop cohesive vision for Markets+



Recognize Markets+ role in benefitting market evolution in the Western Interconnection



Enjoy personal interaction and Have Fun!

# MARKETS



Morning Break

9:30-10:00



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# GENERAL SESSION II MARKET MONITOR PANEL



# AGENDA – GENERAL SESSION II

## MARKET MONITOR PANEL

Panelists Introductions

Panelists Opening Remarks

Moderator Questions

Audience Questions

In-Person Attendees

Virtual Attendees

Panelists Closing Remarks

# MARKET MONITOR PANEL

MODERATOR: PAUL SUSKIE, SPP

PANELISTS: KEITH COLLINS, SPP VP MARKET MONITORING  
JEFF MCDONALD, PH.D., LIBERTAS MARKET ANALYTICS  
DAVID PATTON, PH.D., POTOMAC ECONOMICS

# NEXT STEPS SCHEDULE

KARA FORNSTROM, SPP

# MARKET MONITORING – UPDATE SLIDE

- Denver Meeting: June 1<sup>st</sup> General Session
- Written Comment Opportunity – June 17
  - Comments Due July 15

# MARKETS



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# GENERAL SESSION III TRANSMISSION TOPICS

# AGENDA – GENERAL SESSION III

## TRANSMISSION TOPICS

Base Scheduling – Overview, Value and Application in Markets+	Bri Allen, BPA
Import/Export Wheel Through	
Markets+ System Operations Impact to Tag Transactions	
TSP Data Review and Rate Examples	
Questions/Discussion	
Next Steps	Steve Johnson, SPP

# BASE SCHEDULING

OVERVIEW, VALUE, AND APPLICATION IN MARKETS+

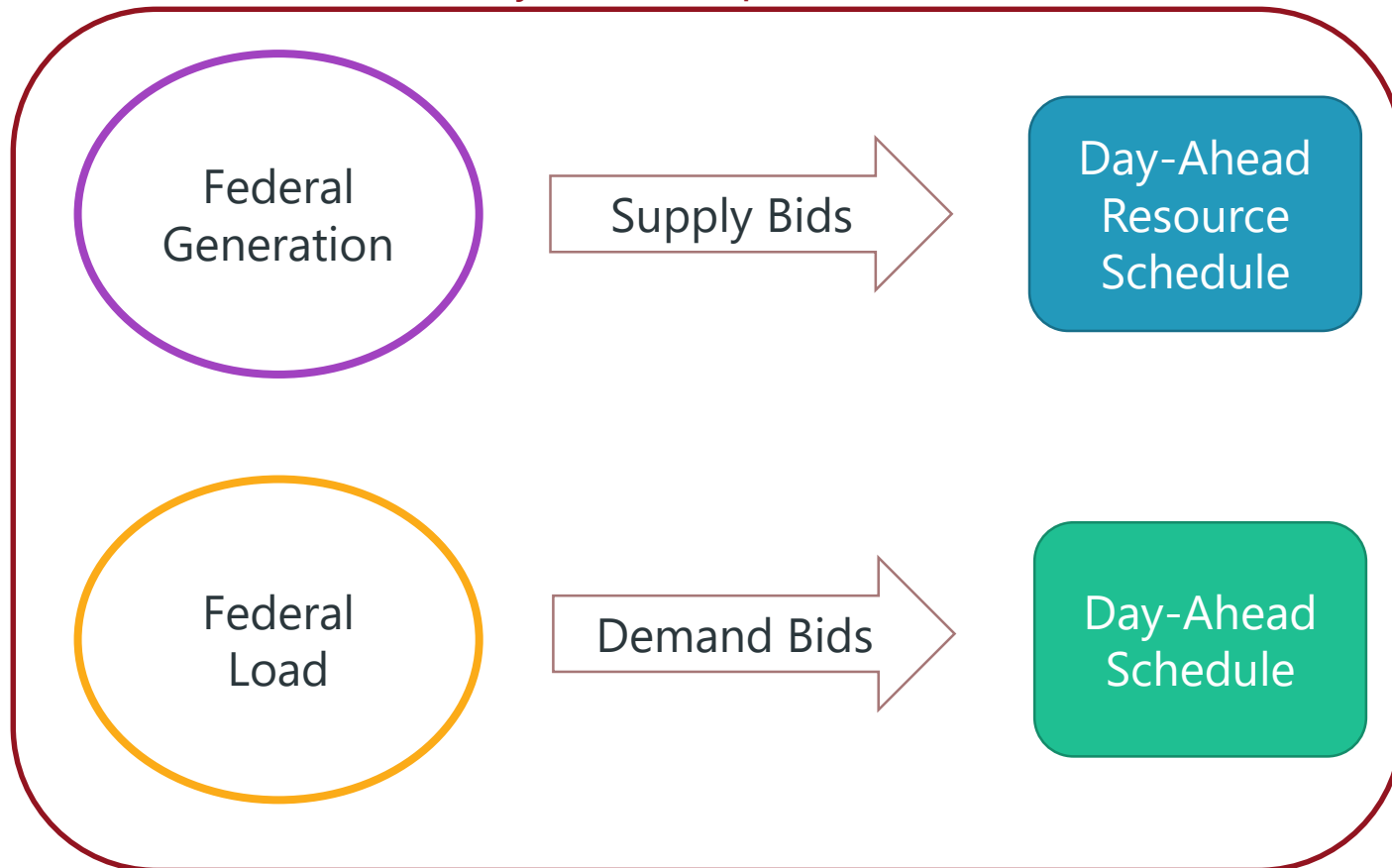


# OVERVIEW OF BASE SCHEDULING CONCEPT

- Base Schedules represent an important bridge between a centralized market and existing commercial and operational paradigms.
- Base Schedules provide a clear tool to demonstrate compliance with important legal, regulatory, and reliability requirements, for example:
  - Environmental attributes, such as GHG
  - Resource adequacy and/or sufficiency
  - Statutory preference - Bonneville Power has statutory obligations to meet the firm power loads of consumer owned utilities when requested by the utility.
    - This includes giving preference and priority at all times to public bodies and cooperatives in disposing of electric energy generated by the Federal projects (i.e. Federal Columbia River Power System).

# ORGANIZED MARKET GENERATION AND LOAD RELATIONSHIP

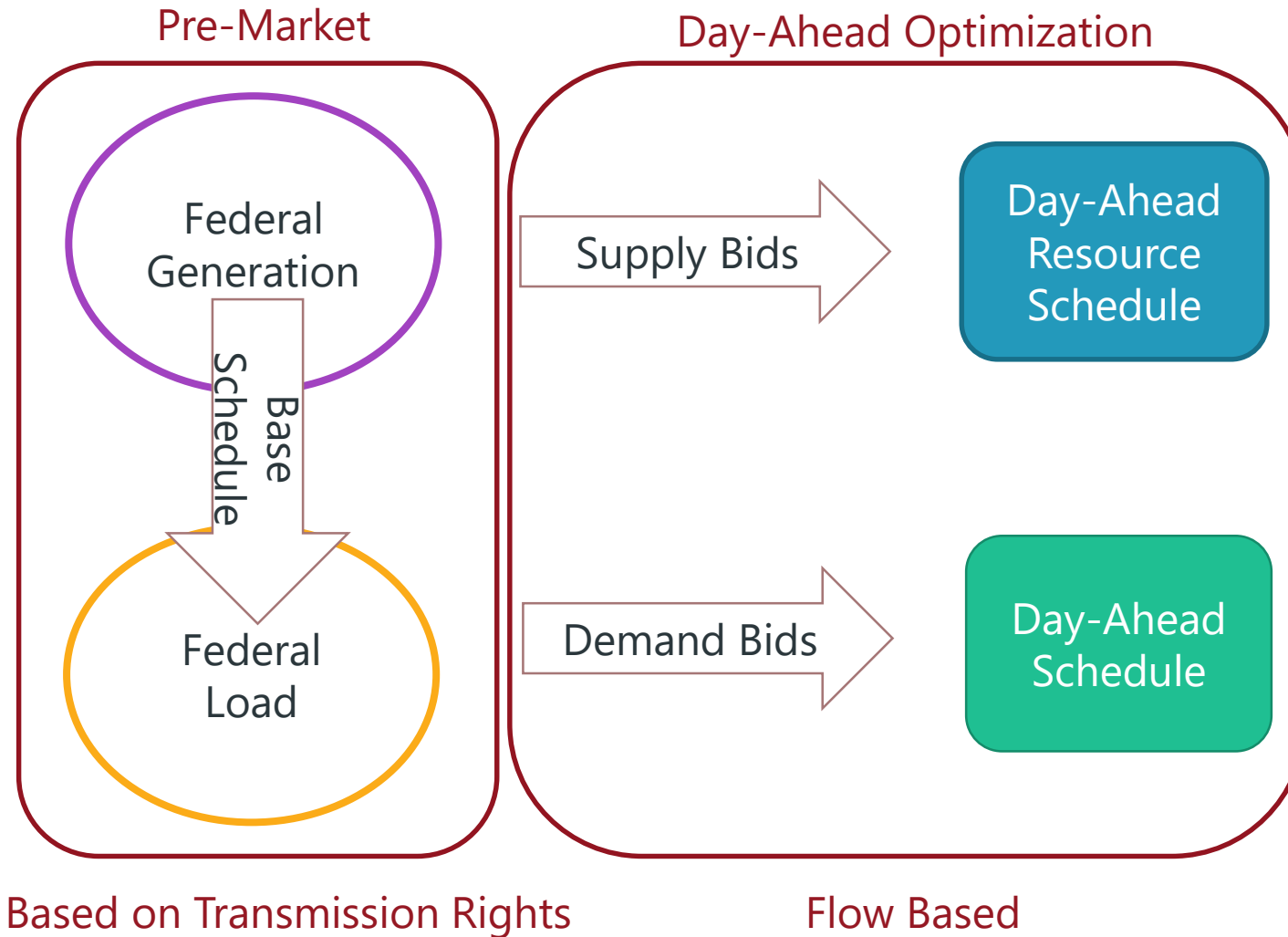
## Day-Ahead Optimization



Generation and load are independently awarded and settled through the market. Generation bids to sell into the market, and Load bids to purchase out of the market.

Relationship between generation and load becomes "financial." Congestion differences are hedged through financial transmission rights i.e. CRRs.

# BASE SCHEDULE GENERATION AND LOAD RELATIONSHIP

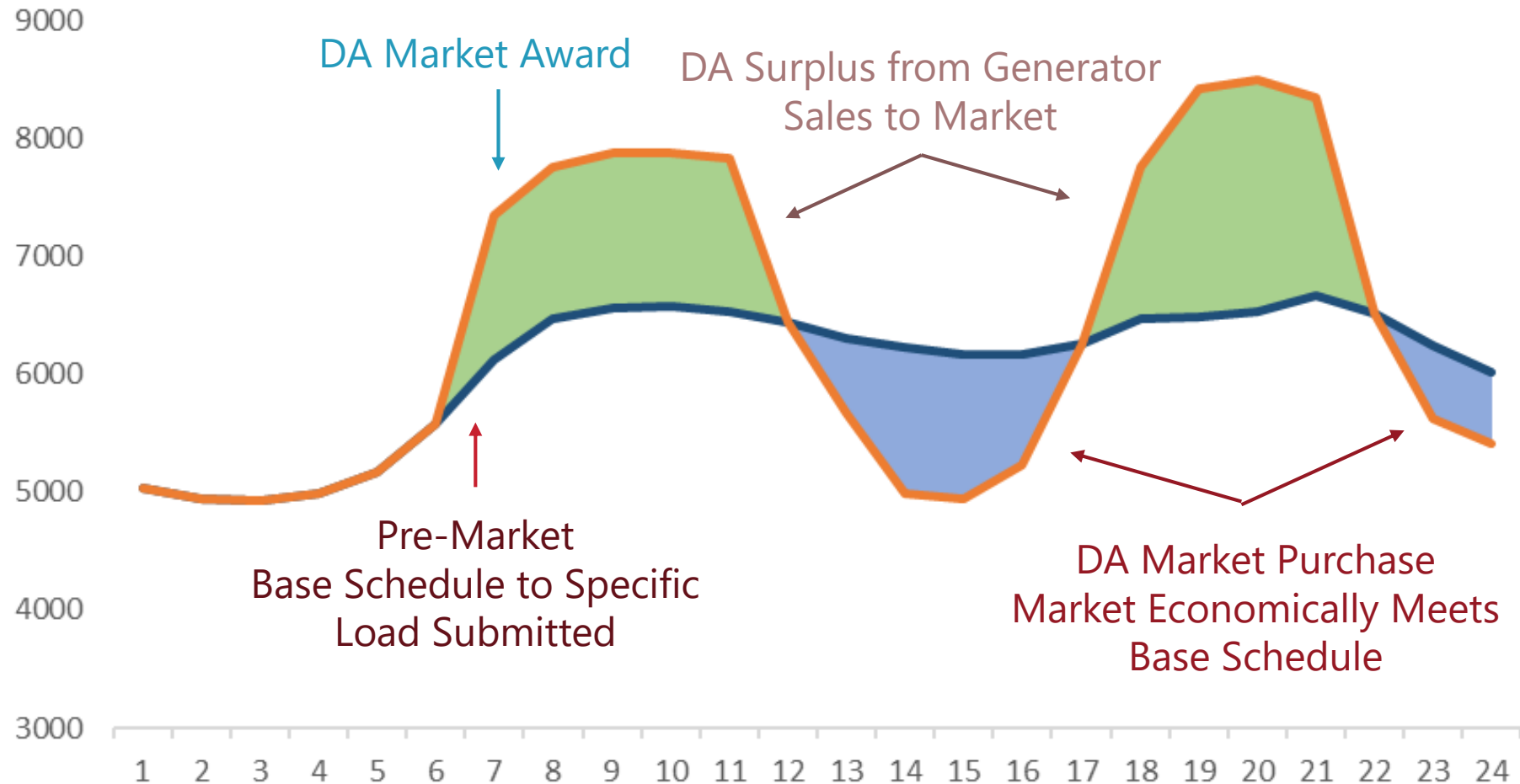


Base Schedule, supported by OATT transmission, establishes a relationship between resource and load prior to the optimization.

Base Schedules are not equivalent to “self-scheduled”. Depending on bidding behavior, the base schedule can ensure the underlying resource is delivered (price taker) or it can be optimized by the market (resource can submit a bid range around its base scheduling point).

Congestion revenue between load and generation is allocated based on transmission reservation, not base schedule.

# BASE SCHEDULE GENERATION AND LOAD RELATIONSHIP



A Base Schedule with an economic bid does not undermine the efficiency of the market solution.

# VALUE - REINFORCES PRIORITY

- The Base Schedule can reinforce priority and determine who flows when a constraint cannot be resolved economically.
- Base Schedules that are tied to e-Tags with OATT transmission can provide a simple, clear link to curtailment priority when a Transmission Service Provider needs to curtail under its OATT
- This is especially important in the Pacific Northwest where deliveries that source/sink inside one BAA can cross multiple TSPs/BAA's on Firm transmission
- Base Schedules can help differentiate priority of exports from the market footprint. They can be used to establish high priority for RA delivery over an economic market schedule when both cannot be supported simultaneously.

# SUMMARY

- The Base Schedule documents the relationship between resources and load without harming the efficiency of the market optimization.
- The Base Schedule can be used to demonstrate compliance with important legal, regulatory requirements.

# IMPORT/EXPORT WHEEL THROUGH

# MARKETS+ NERC ENTITY OPERATIONS

*Normal WECC tagging processes are a completely separate activity from market tag processes*

- **Transmission Footprint (TSP)**
  - No changes to the current TSP TSR processes and operations
  - No change to tags or TSRs for real time operations
- **Balancing Authority Footprints (BA)**
  - No changes to the current BA processes and operations
  - No change to tags or TSRs for real time operations
- **Reliability Coordinator (RC)**
  - No required changes
- **Markets+ Footprint (MO)**
  - SPP will become the Market Operator for the entire joint Markets+ footprint
  - All energy deliveries within the Markets+ footprint will become market flow



# MARKETS+ TAG PROCESSING PROPOSAL

## Current Integrated Marketplace Business Rules

- Integrated Marketplace systems use only specific information from a tag
  - “Interface Point” is the POR/POD where the energy enters or leaves the Marketplace footprint
  - “Scheduling Entity” is used to allow proper accounting for imports and exports for BA NSI
  - Market Participant (MP) will be derived from the tag data (to be determined)
  - TAG sources or sinks are mapped to “settlement locations in the SPP CMT depending upon the type of tag.
  - All Markets+ tags are settled at the LMP for the “interface Point”
- “External” (to Integrated Marketplace) tag sources and sinks are not used in Integrated Marketplace operations or settlements.
- “Internal” (to Integrated Marketplace) tag sources and sinks are mapped to “Settlement Locations” in the SPP Commercial Model

*Current Integrated Marketplace business rules are being used in this presentation to provide a common starting point for discussion of Markets+ design*

# MARKETS+ TAG PROCESSING PROPOSAL

## Current Integrated Market Business Rules (cont.)

- Market system designs intend for all tag transactions to be settled as market dispatch (Flow).
- Current Integrated Marketplace systems do not make a distinction between “Energy Only” tag transactions and “Bilateral Contractual/Base” schedules
- Energy only tags “buy” from a market (no specific source generator) and then sell to external market or BA (no particular load).
- Bilateral contractual/Base Schedule tag transactions include previous contractual obligations for the customer and are usually sold from a particular generator and to a particular load
- Both types of tag transactions are treated the same in real time market system and settlements.

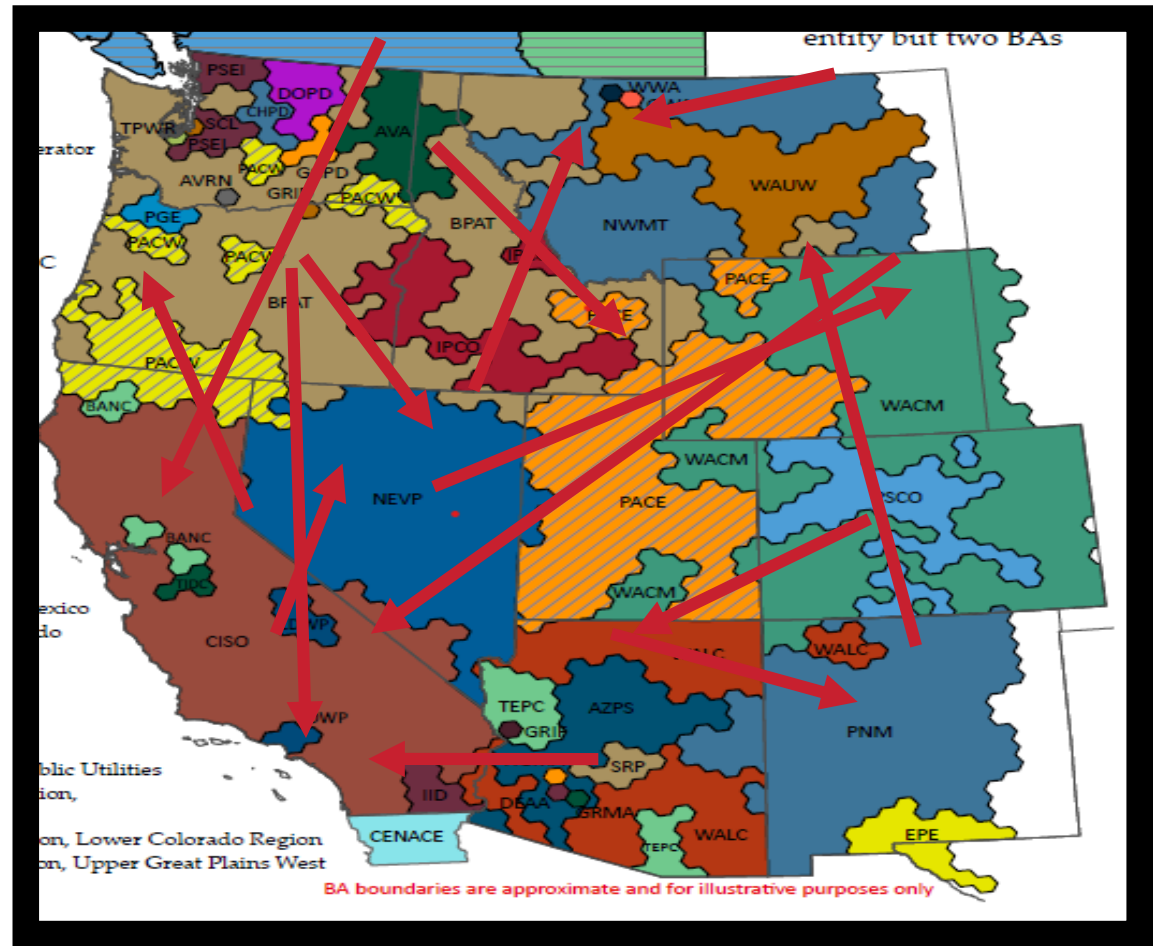
# MARKETS+ TAG PROCESSING PROPOSAL

## Current Integrated Market Business Rules (cont.)

- The Integrated Marketplace uses a Bilateral Scheduling System (BSS) in the settlements process to account for out of market bilateral transactions without “carving” wholesale energy settlements out of the market.
- A similar type of system could be implemented for the Markets+ processes
- In the current BSS design the “settlement” location used for where the transfer of Energy obligation occurs determines which market entity is exposed to deliverability (congestion and losses) costs.
- A presentation on BSS is available for market entities to review.

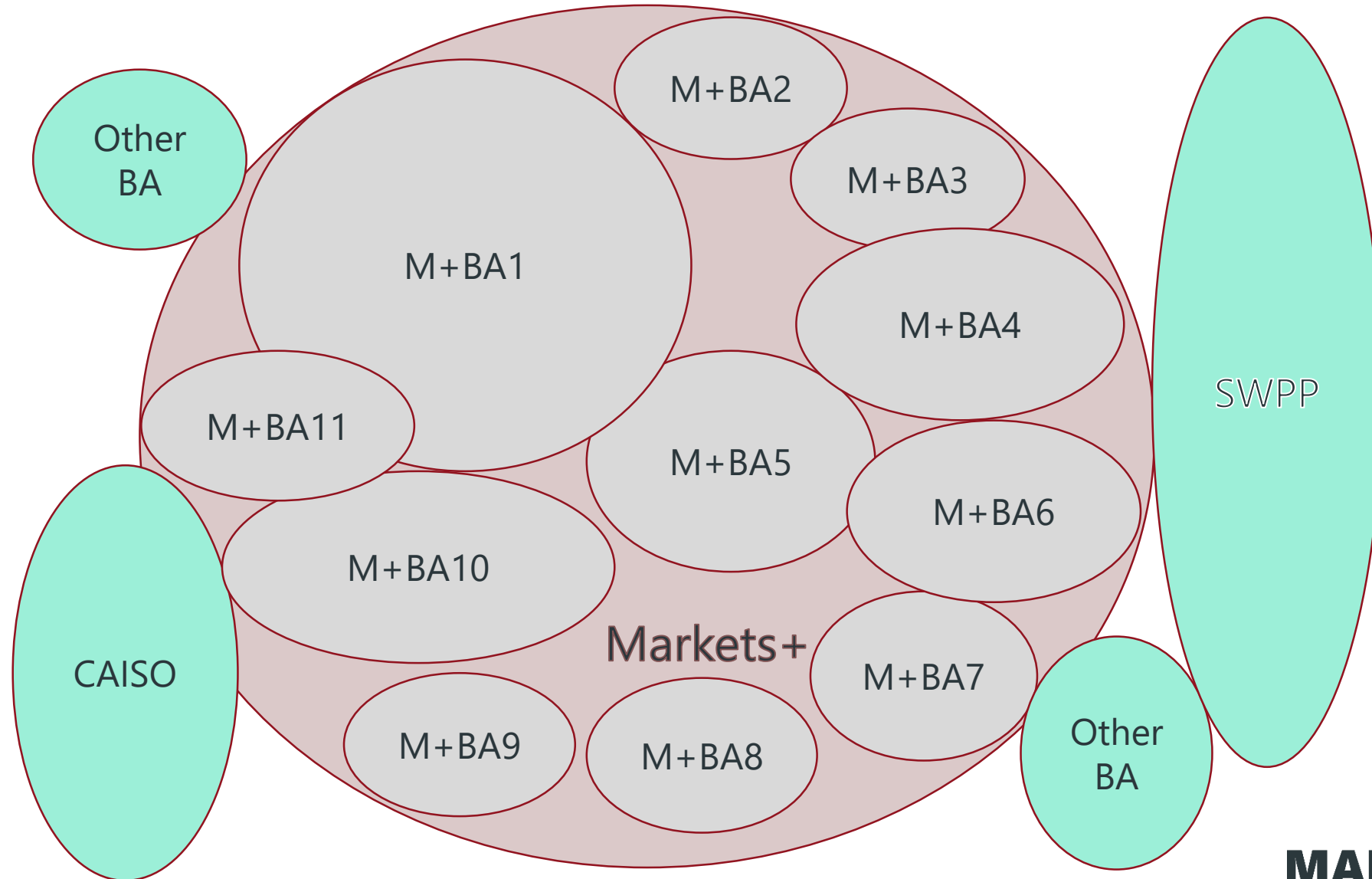
# WECC BA MAP SHOWING MANY TAG TRANSACTIONS CROSSING BALANCING AUTHORITY BOUNDARIES

Note: Markets+ design will have different definitions for Import, Export and Wheel Through tag transactions



*Illustrative example only. Map source: WECC*

# MARKETS+ MULTI-BA FOOTPRINT EXAMPLES

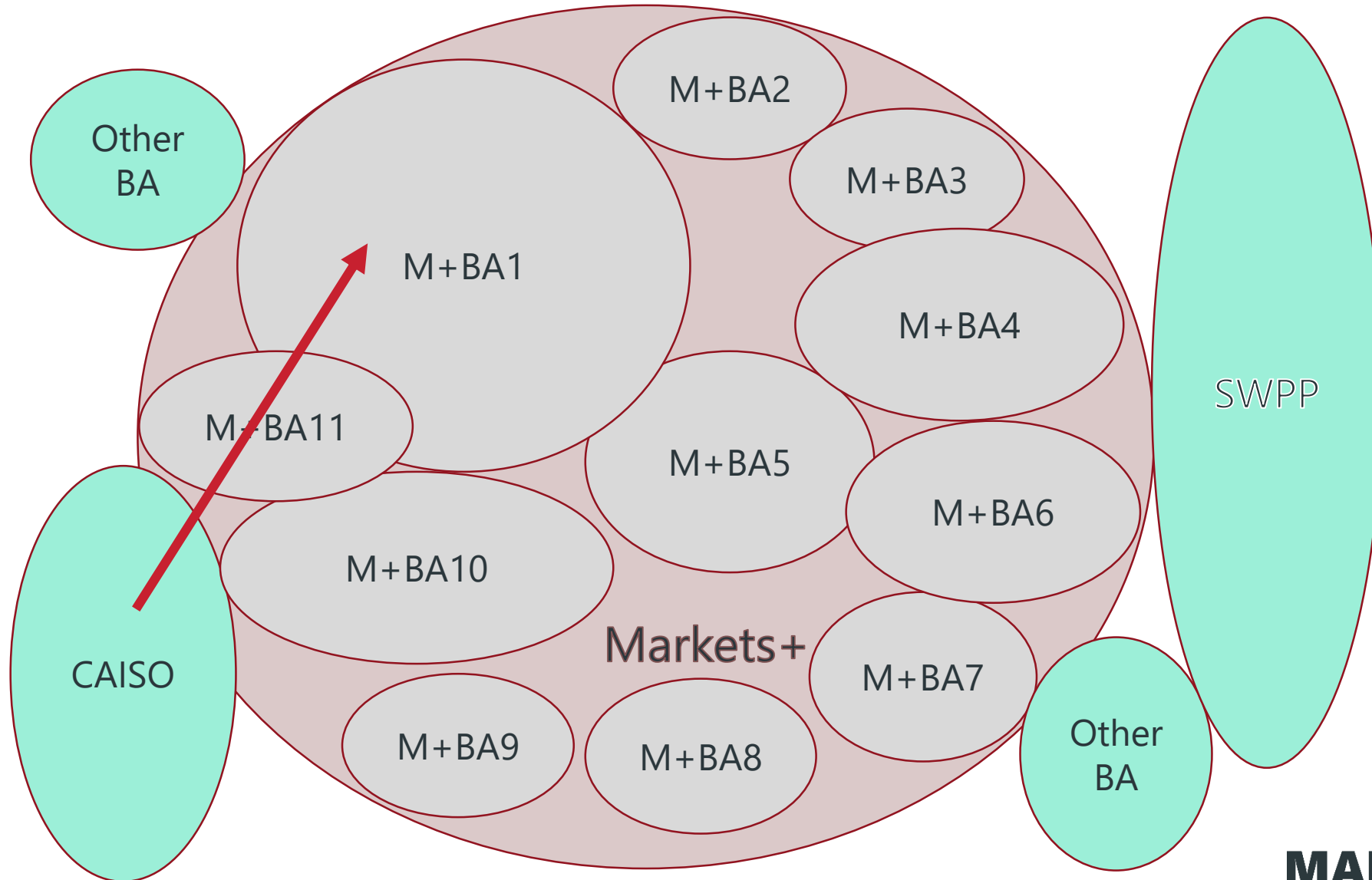


# MARKETS+ TAG SCENARIOS

- Scenario 1 – Tag Imports to Markets+
- Scenario 2 – Tag Exports from Markets+
- Scenario 3 – Tag Wheel Through for Markets+
- Scenario 4 – Tags Internal to Markets+
- Scenario 5 – Tags In and Out of Markets+
- These scenarios are only looking at traditional bilateral transactions in the west
- SPP anticipates incremental tagging to represent centralized dispatch between participating BAs for transparency (data artifact)

*Current Integrated Marketplace business rules are being used in this presentation to provide a common starting point for discussion of Markets+ design*

# SCENARIO 1 – IMPORT TAG TRANSACTION

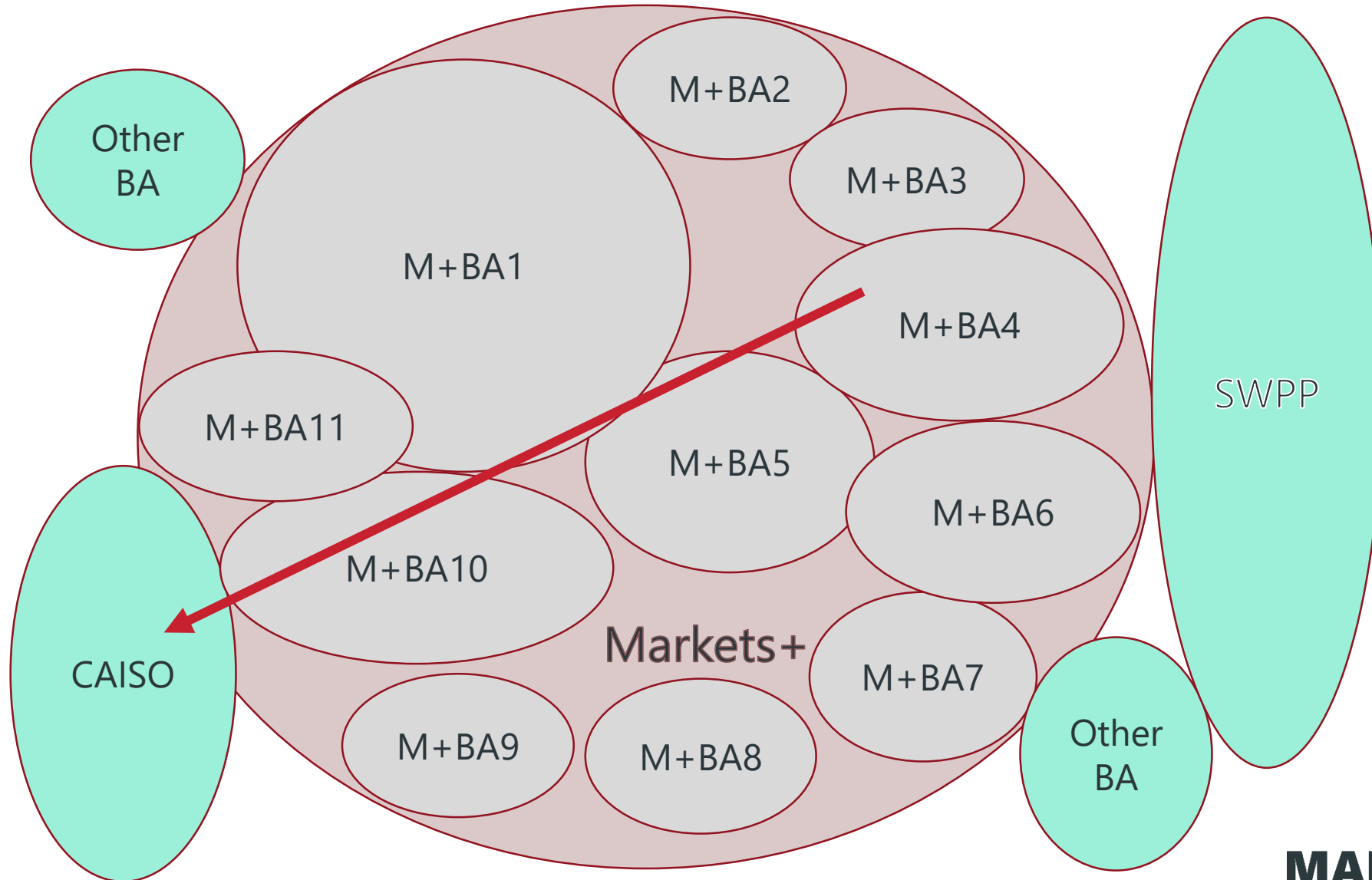


# SCENARIO 1 – IMPORT TAG TRANSACTION

- Markets+ import tags only describe those tags that come into the Markets+ footprint from an external entity (ex. CAISO). Can sink in any Markets+ BA
- Import tags are identified to the market system by the first scheduling entity that is a Markets+ BA.
- The interface point at the Markets+ border is used to determine the LMP to settle the import tag.
- The Markets+ system does not recognize or use generation that originates outside of Markets+ for systems or settlements.
- The Markets+ system does not deliver external generation to a specific load inside of the footprint. The load is served by market dispatch
- The Markets+ systems use the “Sink” on the tag as a reference to determine the Market Participant for settlements.



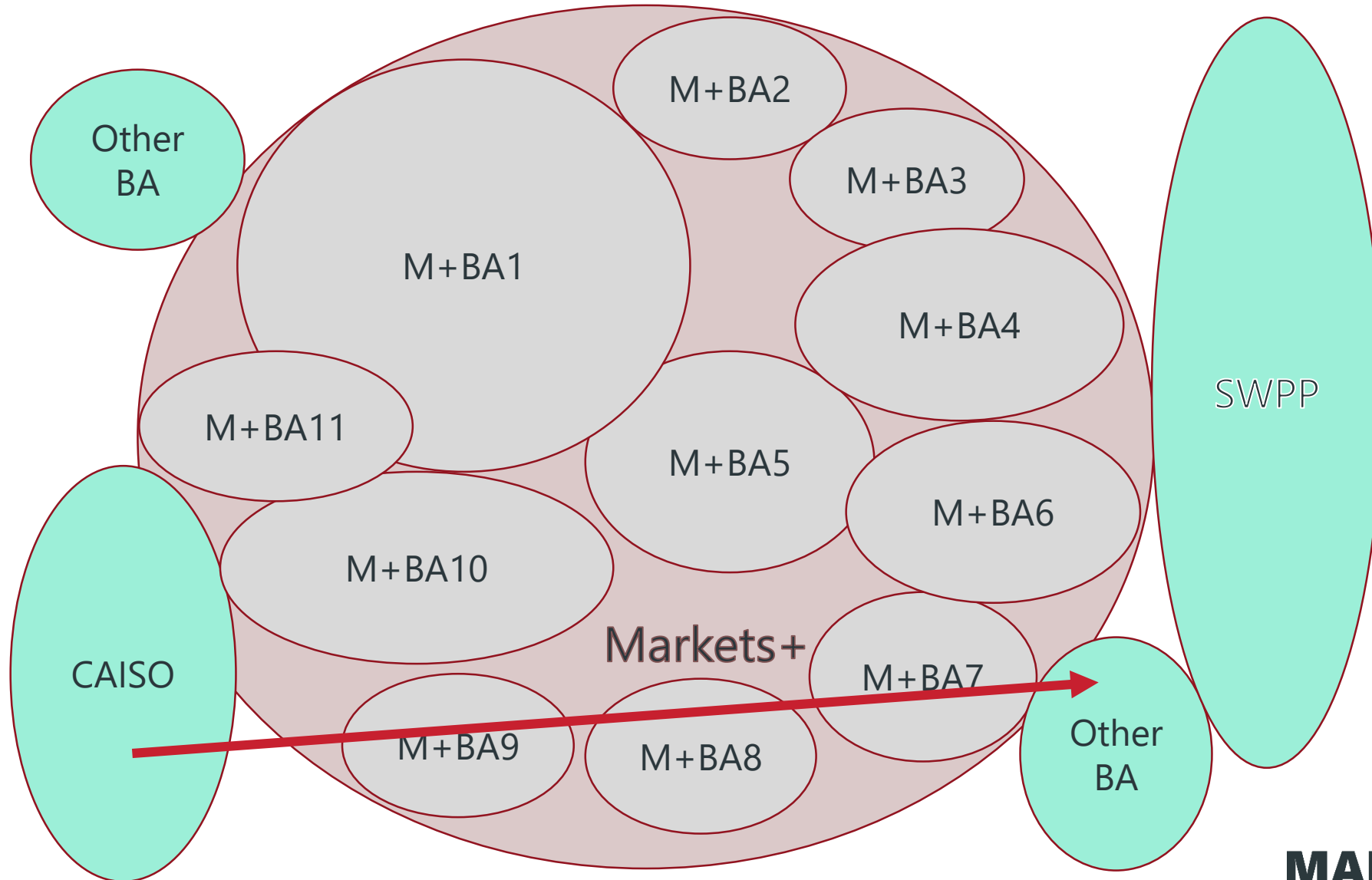
# SCENARIO 2 – EXPORT TAG TRANSACTION



## SCENARIO 2 – EXPORT TAG TRANSACTION

- Markets+ export tags only describe those tags that leave the Markets+ footprint from an internal entity. Can source from any Markets+ BA.
- Markets+ export tags are identified to the system by the last scheduling entity that is a Markets+ BA.
- The interface point at the Markets+ border is used to determine the LMP to settle the export tag.
- The Markets+ system does not recognize or use loads that receive generation from Markets+ for systems or settlements (Markets+ will not settle with external parties).
- The Markets+ systems use the “Source” on the tag as a reference to determine the Market Participant for settlement.
- The export tag does not directly impact the commitment or dispatch of an individual generator/resource.

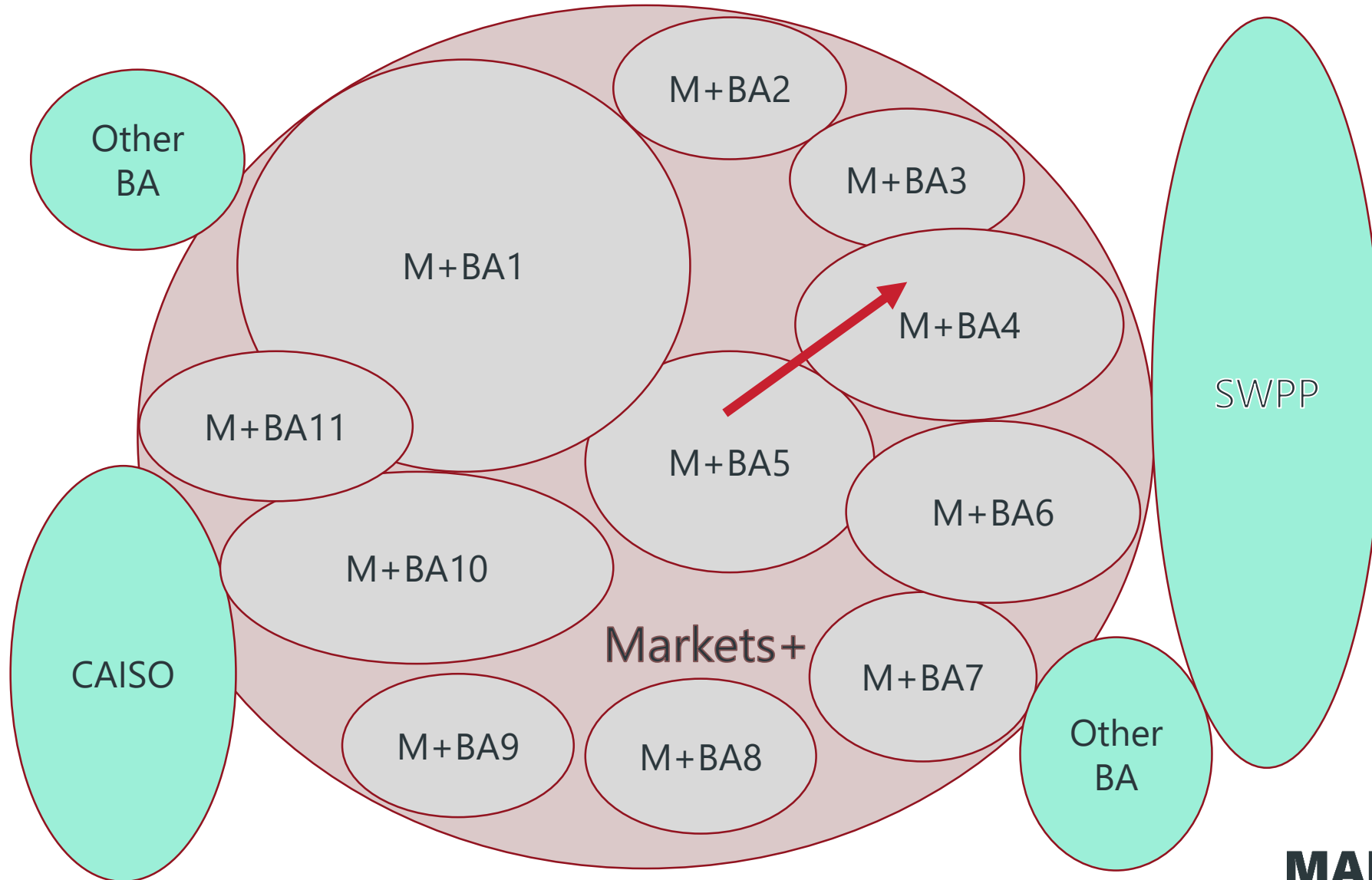
# SCENARIO 3 – WHEEL THROUGH TRANSACTION



## SCENARIO 3 – WHEEL THROUGH TRANSACTION

- Markets+ wheel through tags originate and terminate external to the Markets+ footprint but cross boundaries between BAs and TSPs inside Markets+
- Markets+ systems do not use external sources or sinks on wheel through tags
- The interface point for the entry of the tag and the exit of the tag (Markets+ footprint) are used to determine the LMP difference as needed for settlements

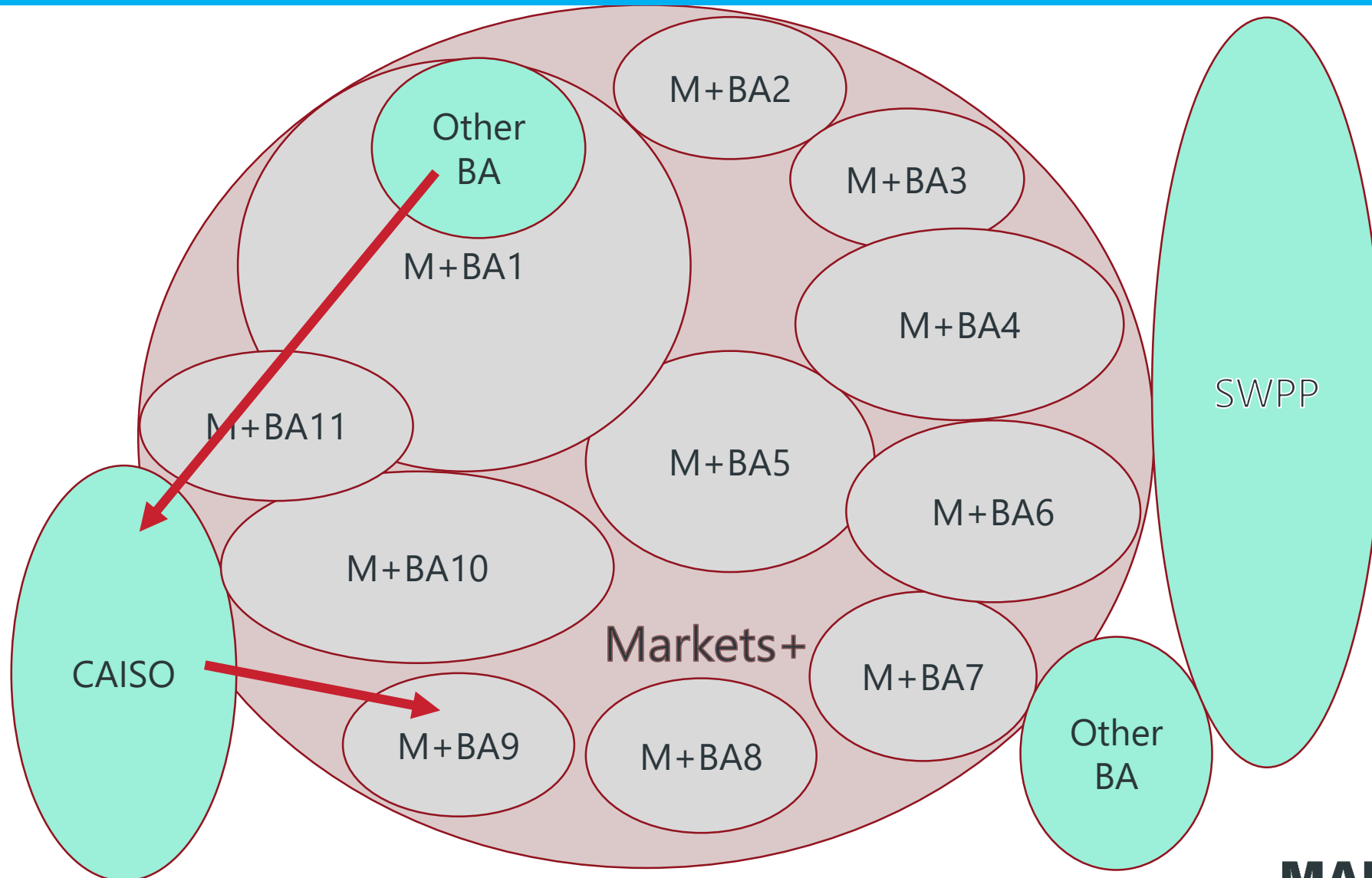
# SCENARIO 4 – INTERNAL TRANSACTIONS



## SCENARIO 4 – INTERNAL TRANSACTIONS

- Markets+ internal tags include all tags wholly within the Markets+ footprint even if they cross boundaries between BAs inside Markets+
- Markets+ will acknowledge internal tags for normal operations
- Markets+ would ignore these tags for market system processing
- Internal transactions settle as market flow
- Markets+ entities need to determine if internal tags would use a system design similar to BSS

# SCENARIO 5 – IN AND OUT TAG TRANSACTIONS



# SCENARIO 5 – IN AND OUT TAG TRANSACTIONS

- The current Integrated Marketplace does not have any in and out tags.
- In and out tags could be treated as individual import/export tags for settlement.



Image source: In-N-Out Burger




# MARKETS+ SYSTEM OPERATIONS IMPACT TO TAG TRANSACTIONS

# DAY AHEAD MARKETS+ TAG PROCESSING

- Tags can be used to bid or offer into the DA market.
- Additional data is needed by the DA market for the bid or offer that is not included on a normal tag.
- The Integrated Marketplace had a special Market section added to e-tag Vendor systems
- Otherwise tags are processed by the scenarios described in the previous slides.
- DA market does not make changes to TSR on the tag
- DA clearing process makes automatic “market adjustments” to the e-tag as the market operator. DA market adjustments are not curtailments to tags.
- Market adjustments require approval of PSE, TSP and BA on the tag.

# DAY AHEAD MARKETS+ TAG PROCESSING

Example new market section for tag template

SPP Market Information (all times in CPT)									
Market Date		Market			Trans Type				
<input type="text"/> 		<input type="text" value="Day-Ahead"/> ▾			<input type="text" value="Dispatchable"/> ▾				
HE01	<input type="text"/>	HE05	<input type="text"/>	HE09	<input type="text"/>	HE17	<input type="text"/>	HE21	<input type="text"/>
HE02	<input type="text"/>	HE06	<input type="text"/>	HE10	<input type="text"/>	HE18	<input type="text"/>	HE22	<input type="text"/>
HE03	<input type="text"/>	HE07	<input type="text"/>	HE11	<input type="text"/>	HE19	<input type="text"/>	HE23	<input type="text"/>
HE04	<input type="text"/>	HE08	<input type="text"/>	HE12	<input type="text"/>	HE20	<input type="text"/>	HE24	<input type="text"/>

# REAL TIME MARKETS+ TAG PROCESSING

- Integrated Marketplace Real Time Balancing Market (RTBM) does not use individual tags in system processing
- Integrated Marketplace RTBM does not make changes to individual tags or TSRs
- Markets+ RTBM will use the NSI for each Balancing Authority internal to the Markets+ footprint for system processing

# TSP DATA REVIEW AND RATE EXAMPLES

# TRANSMISSION DATA

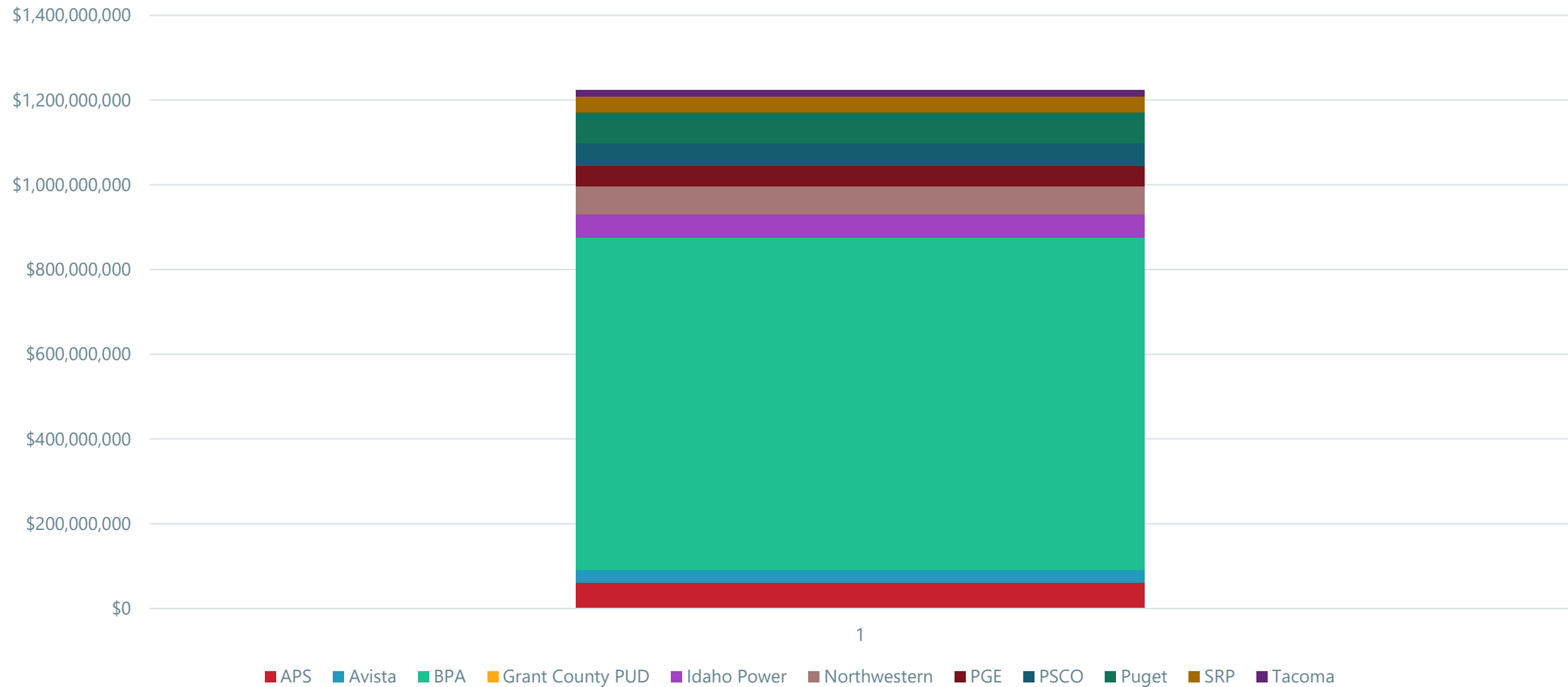
- 11 Companies Provided Initial Data
  - Arizona Public Service
  - Avista
  - Bonneville Power Administration
  - Grant County PUD
  - Idaho Power
  - Northwestern Energy
  - Portland General Electric
  - Puget Sound Energy
  - Public Service Colorado
  - Salt River Project
  - Tacoma Power

# TRANSMISSION REVENUE DATA

Transmission Product	Totals	Totals less BPA
Total affiliate and third party	\$1,224,638,779	\$440,304,345
STF+NF percentage of total affiliate and third party	12%	23%
Short-term Firm	\$88,091,387	\$59,339,042
Non-Firm	\$60,442,798	\$42,742,574
Total STF+NF	\$148,534,185	\$102,081,615
Total ATRR	\$2,211,887,206	\$1,201,167,300
STF+NF Percentage of total ATRR	5%	6%

# TOTAL AFFILIATE AND THIRD PARTY REVENUE

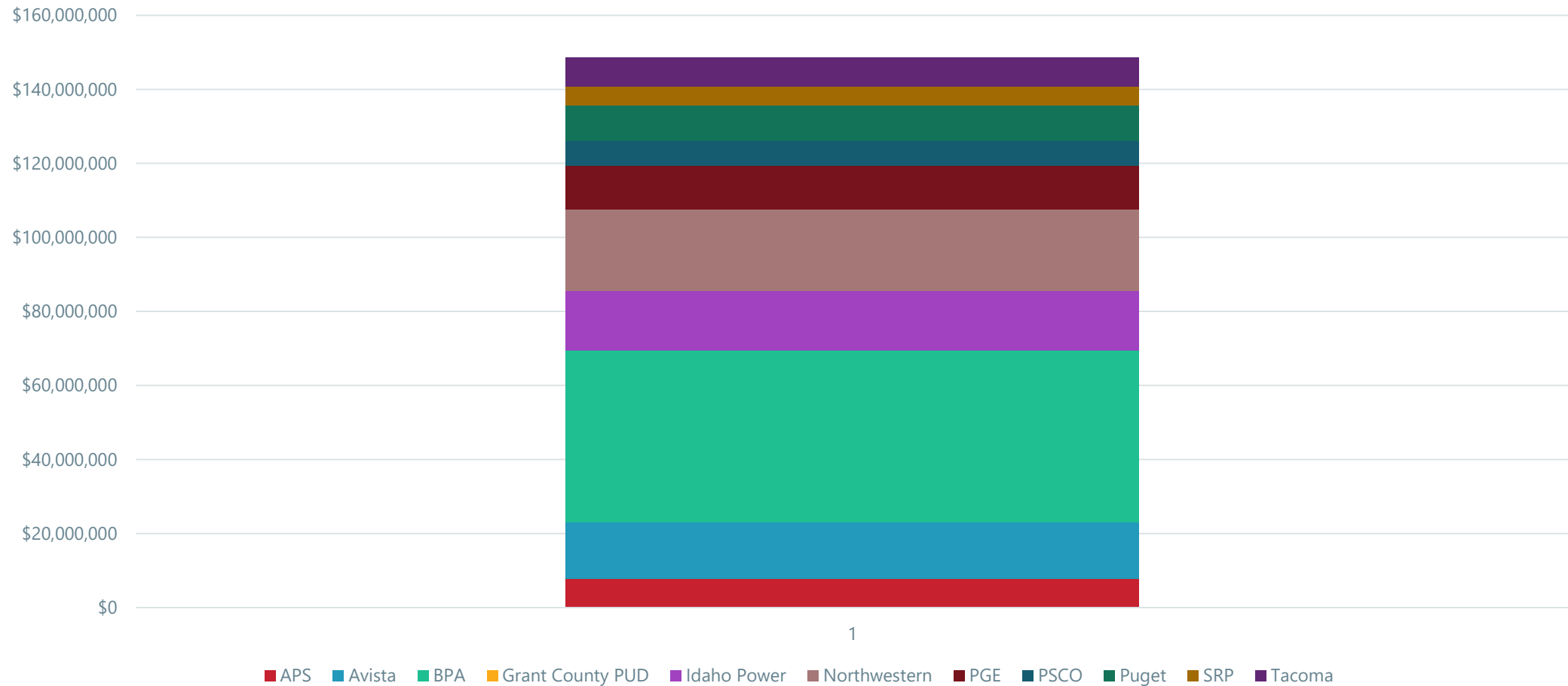
Affiliate and Third Party Revenue



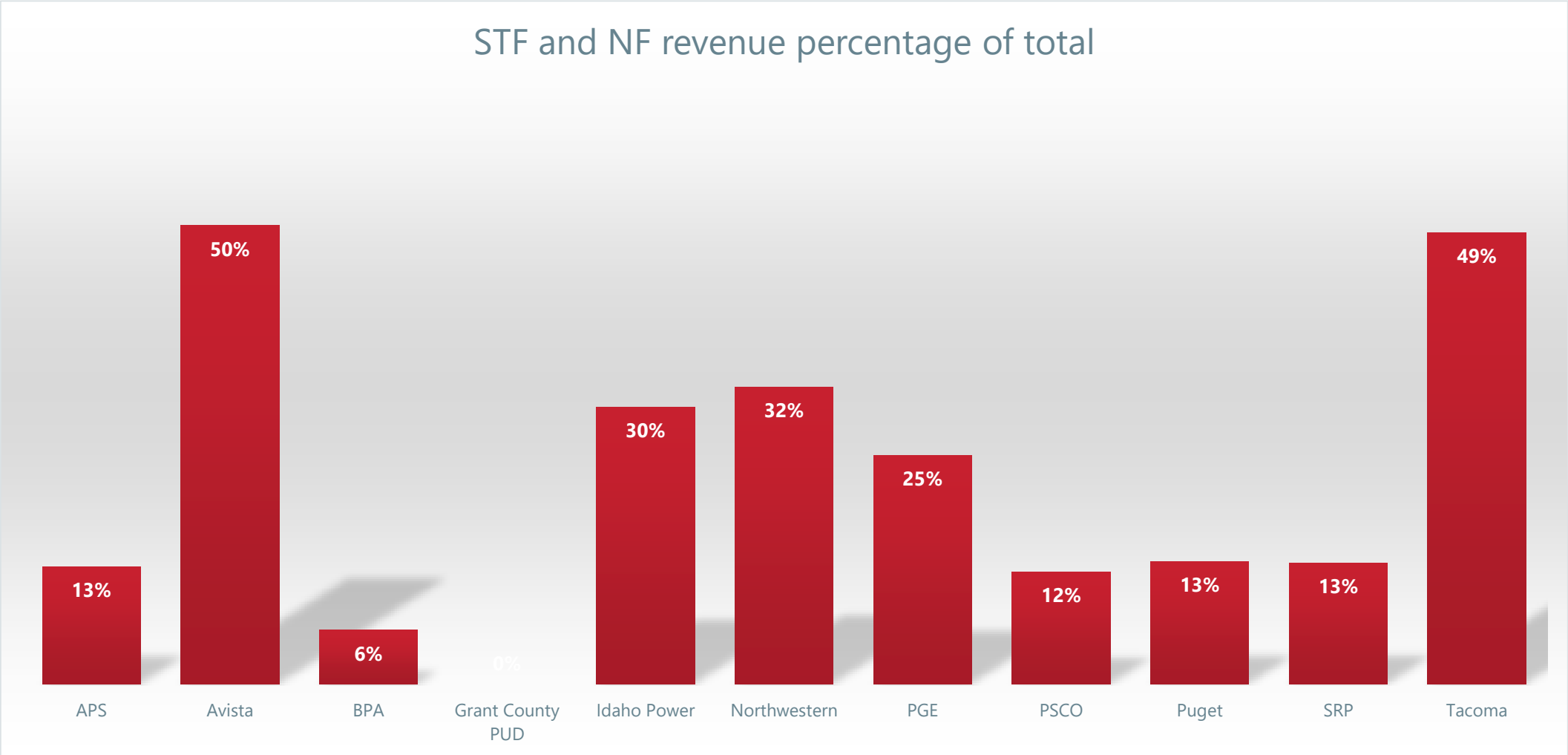


# AFFILIATE AND THIRD PARTY SHORT-TERM FIRM+NON-FIRM REVENUE

Affiliate and Third Party STF+NF



# ENTITY'S PERCENTAGE OF SHORT-TERM FIRM AND NON-FIRM IN THEIR TOTAL AFFILIATE AND 3<sup>RD</sup> PARTY REVENUE



# MARKETS+ RATE EXAMPLE

Assumes recovery of all current affiliate and third party short-term firm and non-firm revenue (\$148.5M)

Rate based on load	Total	Total less BPA
MW/yr	\$4,502	\$4,637
MW/mo	\$375	\$386
MW/hr	\$0.51	\$0.53

# QUESTIONS/DISCUSSION

# NEXT STEPS

STEVE JOHNSON, SPP

# LUNCH BREAK

GDT BREAKOUT SESSION – NEED BADGES

LUNCH – DIETARY RESTRICTIONS

# MARKETS



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# BREAKOUT SESSIONS



**GOVERNANCE DESIGN TEAM**

**BREAKOUT SESSION**

# AGENDA – GOVERNANCE BREAKOUT SESSION

1:30-2:15	Panel – Initial Reactions
2:15-3:00	Workshop Issues
	Straw Proposal Questions/Discussion

# GOVERNANCE PANEL STRAW PROPOSAL REACTIONS

MODERATOR: MARY ANN ZEHR, TRI-STATE

PANELISTS: ALY KOSLOW, APS  
MAURY GALBRAITH, WIEB  
LEA FISHER, PGP  
SCOTT MILLER, WPTF  
ALAINE GINOCCHIO, WRA

# GOVERNANCE WORKSHOP ISSUES

# MARKETS



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# **JOINT TRANSMISSION AND MARKET DESIGN TEAMS**

## **BREAKOUT SESSION**

# AGENDA – JOINT TRANSMISSION AVAILABILITY AND MARKET DESIGN TEAMS BREAKOUT SESSION

Congestion Management	SPP Staff
Operational Congestion Management – An Overview	
Congestion & Seams Coordination	
Congestion & Price Formation	
Transmission Congestion Cost Example Non-Binding and Binding	
Questions/Discussion	
Next Steps	

# OPERATIONAL CONGESTION MANAGEMENT

AN OVERVIEW

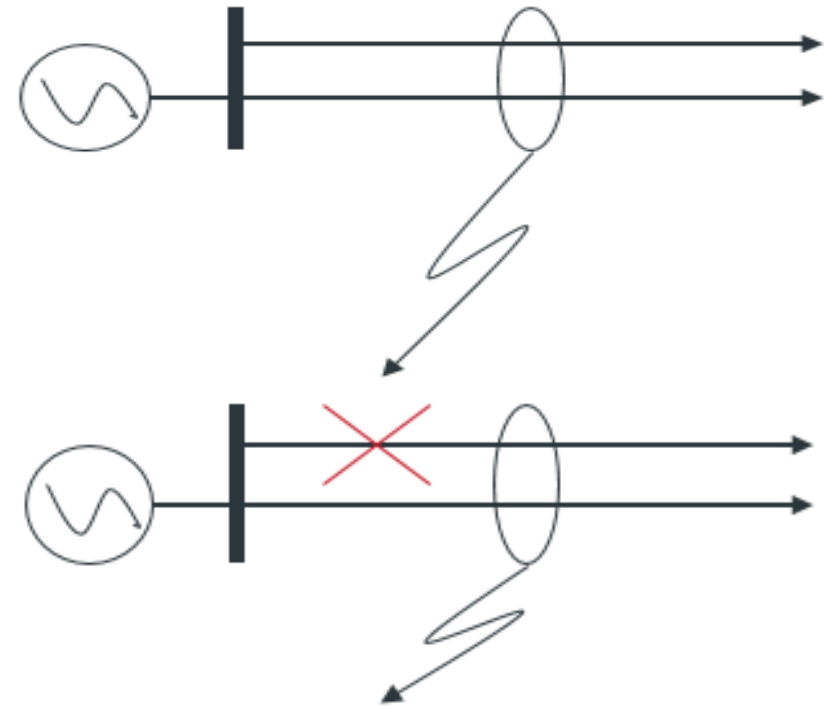


# WHAT IS CONGESTION?

- Generation -> Transmission -> Load
- “Bottleneck” when energy cannot get to a customer on a particular transmission element due to:
  - Desired electricity flows exceed physical capability
    - System Operating Limits - *Thermal, Voltage/Stability*
  - Contractual Limitations
    - defined transfer Transmission Paths

# FLOWGATE CONSTRAINT

- A mathematical construct for identified transmission constraints, comprised of one or more monitored transmission facilities and optionally one or more contingency Facilities.
- PTDF is a Power Transfer Distribution Flowgate that is typically controlling a group monitored transmission elements to a total real-time flow based on thermal or stability transfer limitation - *typically identified thru power flow transfer studies*
- OTDF is an Outage Transfer Distribution Flowgate that is controlling transmission elements in a 'what-if' n-1 condition. The Reliability Coordinator controls the flowgate of a *monitored element* such that if a *contingent element* trips, the element monitored does not exceed its limit- *typically represents RTCA identified transmission constraints*



## OTHER CONSTRAINTS CATEGORIES

- **WECC Path:** TSP/WECC defined transmission paths designed to limit intertie transfers. The characteristics of a path relate to the lines it is composed of, though paths are not always a simple aggregation of the individual transmission equipment characteristics.
- **Zonal Constraints:** Defining zones within the market to limit energy transfer to respect transmission service limitations.

# TRANSMISSION CONSTRAINT TYPES

<i>Constraint Type</i>	<i>SOLs / IROLs (Reliability Based Constraints)</i>	<i>WECC Paths / Qualified Paths</i>	<i>Zonal Transfer Constraints</i>
<i>Source</i>	RTCA or Power Flow Studies Coordinated with RC	Transmission Service Providers	Third Party Reliability based Limitation (e.g. Reserve Sharing Group)
<i>Modeled as</i>	<b>Flowgates (OTDF or PTDF)</b>	<b>SPP Service Flow Constraint (SFC)</b>	<b>Zonal Constraints between Zones</b>

# CONSTRAINTS MANAGEMENT



# CONGESTION & SEAMS COORDINATION

# MARKET-TO-MARKET (M2M)



- Transmission constraint specific coordination agreement with a neighboring market
- Defined transmission rights allocated to each Market entity (e.g., Markets+ with CAISO DA/EIM Coordination)
- Each Market is assigned a relief request by the “monitoring entity”
  - Native Gen -> Load re-dispatch. Not a transfer of Energy
- Least cost solution between the markets to achieve relief



# M2M Objectives

## WHY M2M?

- Lower congestion cost: expanding the pool of resources to solve congestion effectively and economically
- Price convergence on the seams reflecting congestion in the area.
- More Reliable operation: allowing the RC and market to resolve congestion utilizing a bigger selection of resources



### Greater Re-dispatch Efficiency

Allows a more efficient re-dispatch solution for coordinated constraints across multiple systems



### Consistent Pricing

Provides more consistent and effective pricing profile across the two (2) Markets



### Enhanced System Reliability

Pools Resources from both RTOs to jointly control transmission constraints near the RTO borders



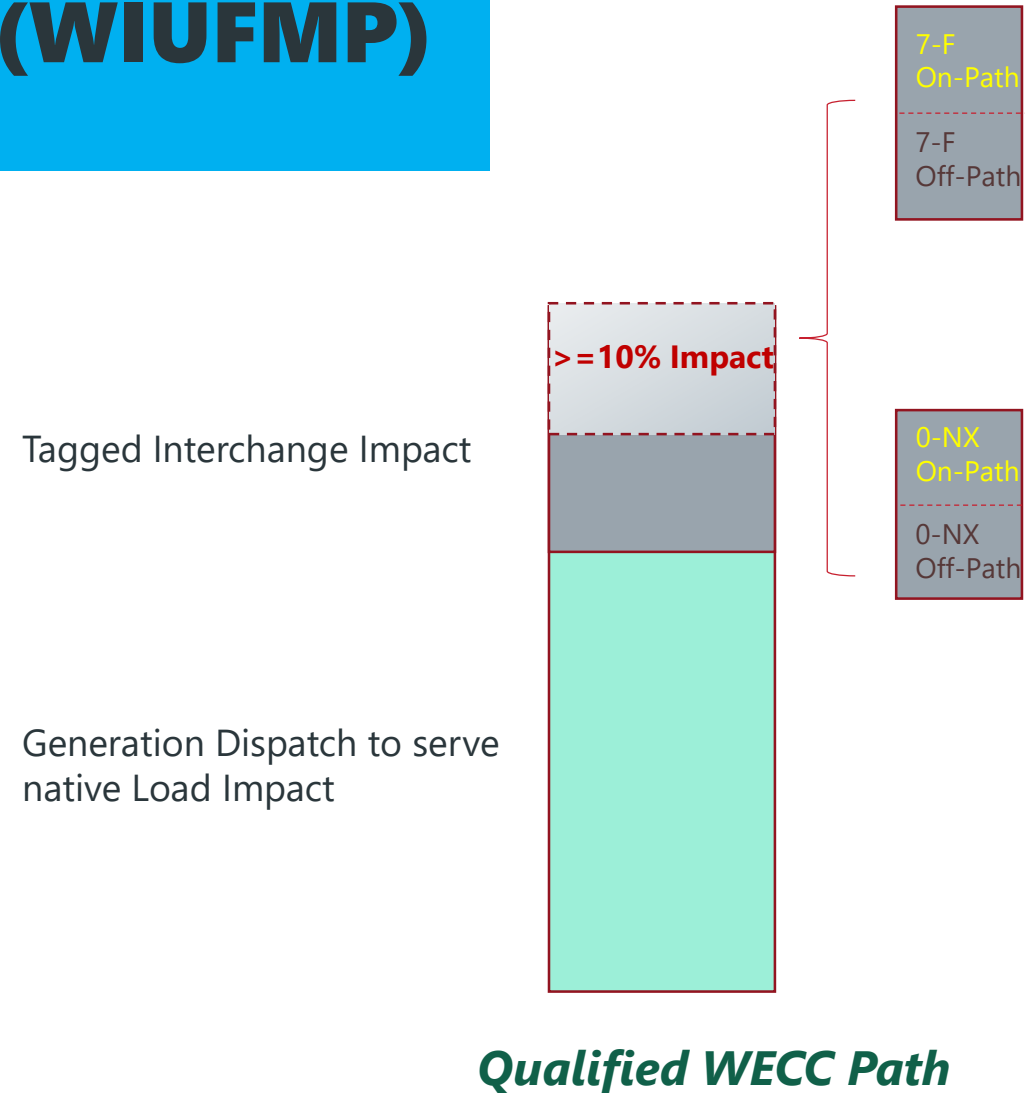
### Compensation

Provides a payment mechanism for two-market congestion management



# UNSCHEDULED FLOW MITIGATION PROCESS (WIUFMP)

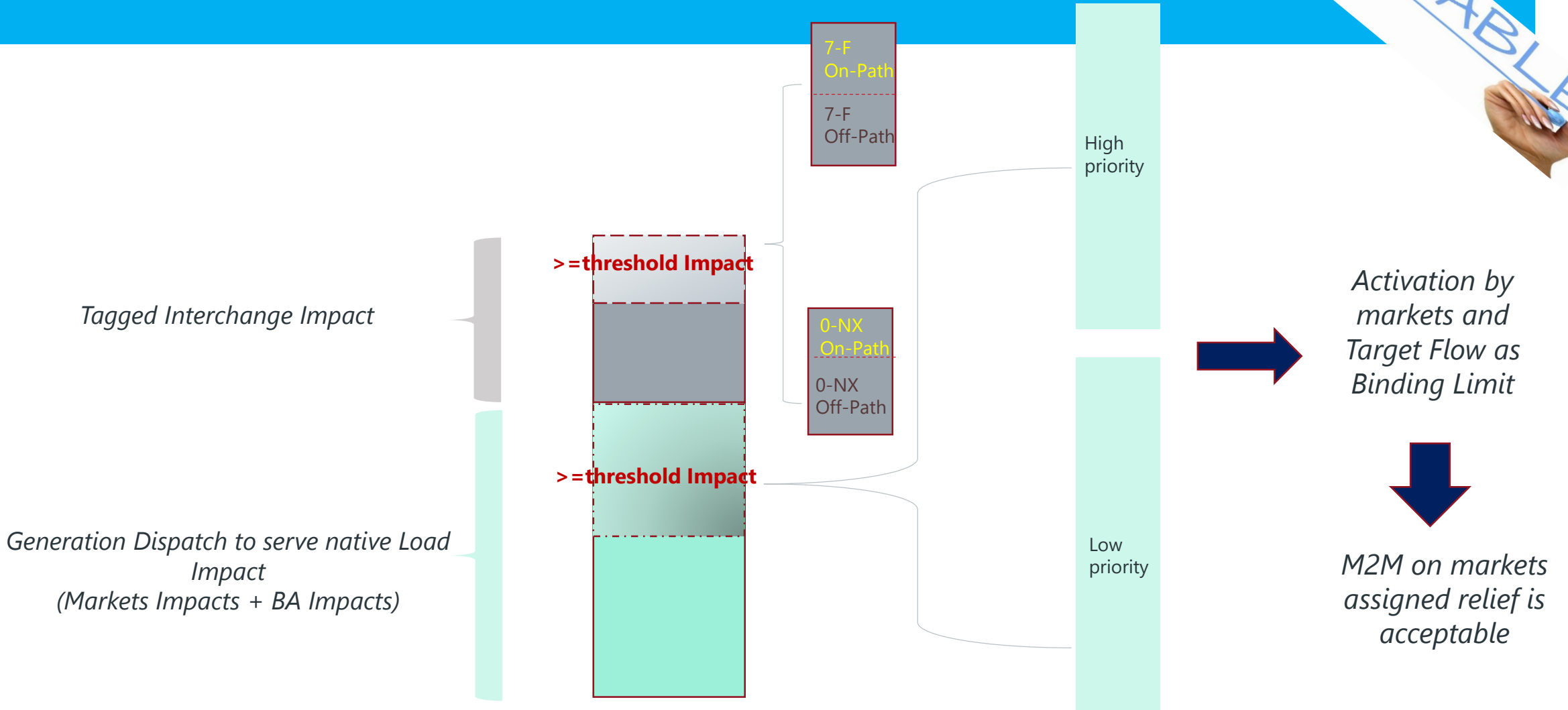
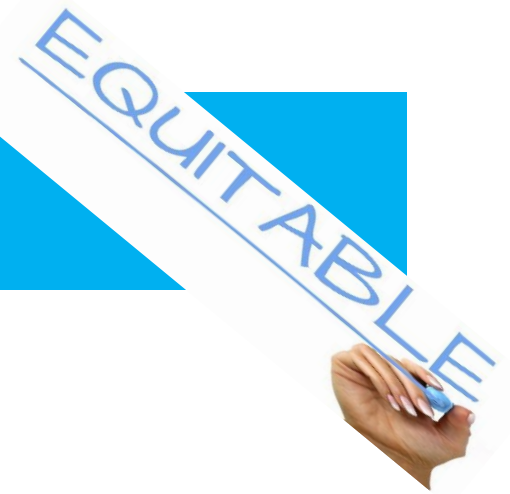
- Western Interconnection coordinated on **4** Qualified Paths.
- WIUFMP event initiated by Path Operators:
  - Phase Shifter adjustment and
  - Tagged energy transaction schedules are subject to curtailment.



# ECC – WI COORDINATION CONG. MGMT EXPANSION

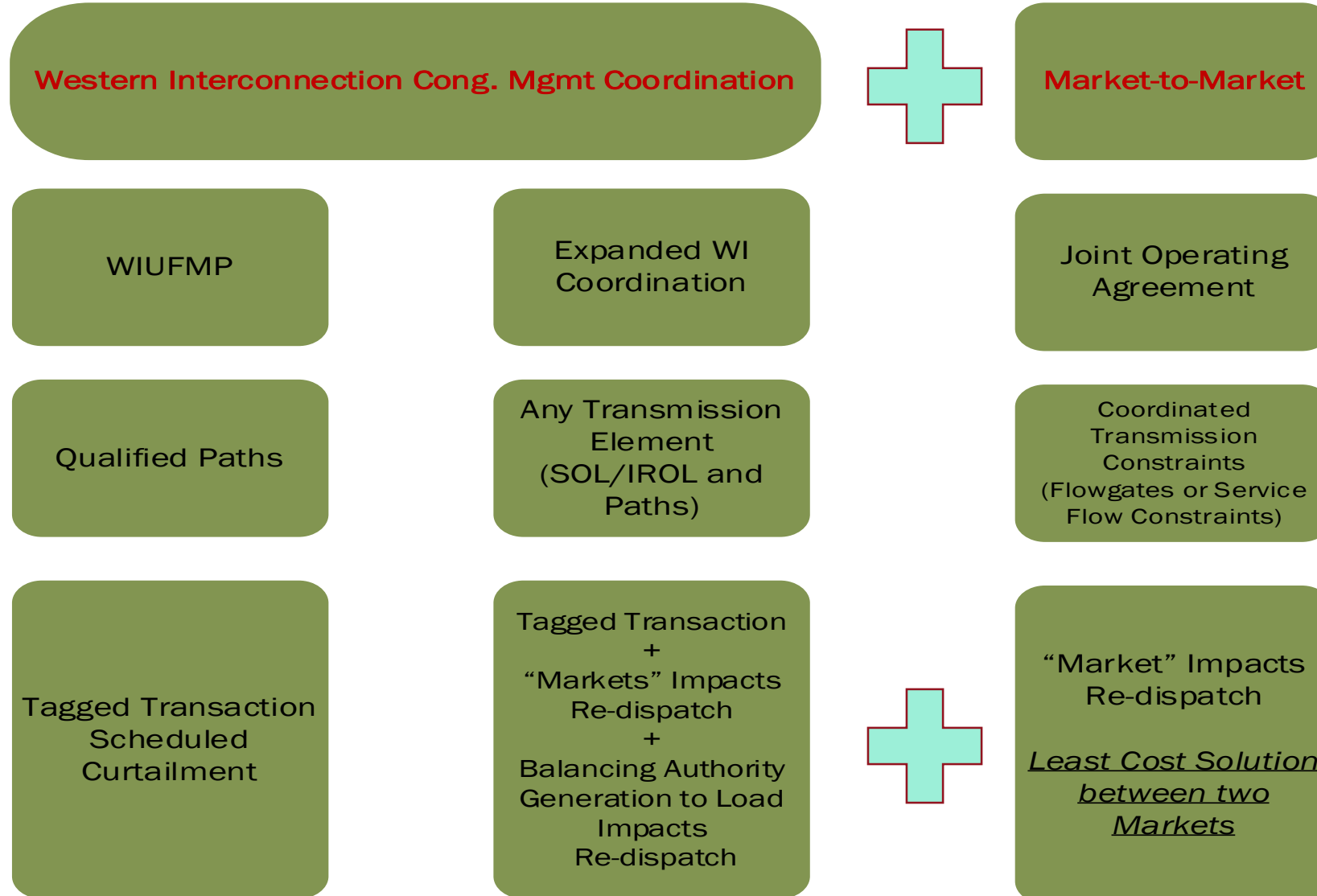
- Expand transmission relief allocation to tagged transaction schedules and BA non-tagged impact equitably and effectively utilizing transmission priorities and a threshold impact.
- Ability to capture the impact breakdown of every transmission constraint created by a TOP, BA, or RC utilizing an existing application.
- Expand coordinated western interconnection congestion to all SOLs/IROLs and WECC Paths

# EXPANDED WI CONG. MANAGEMENT



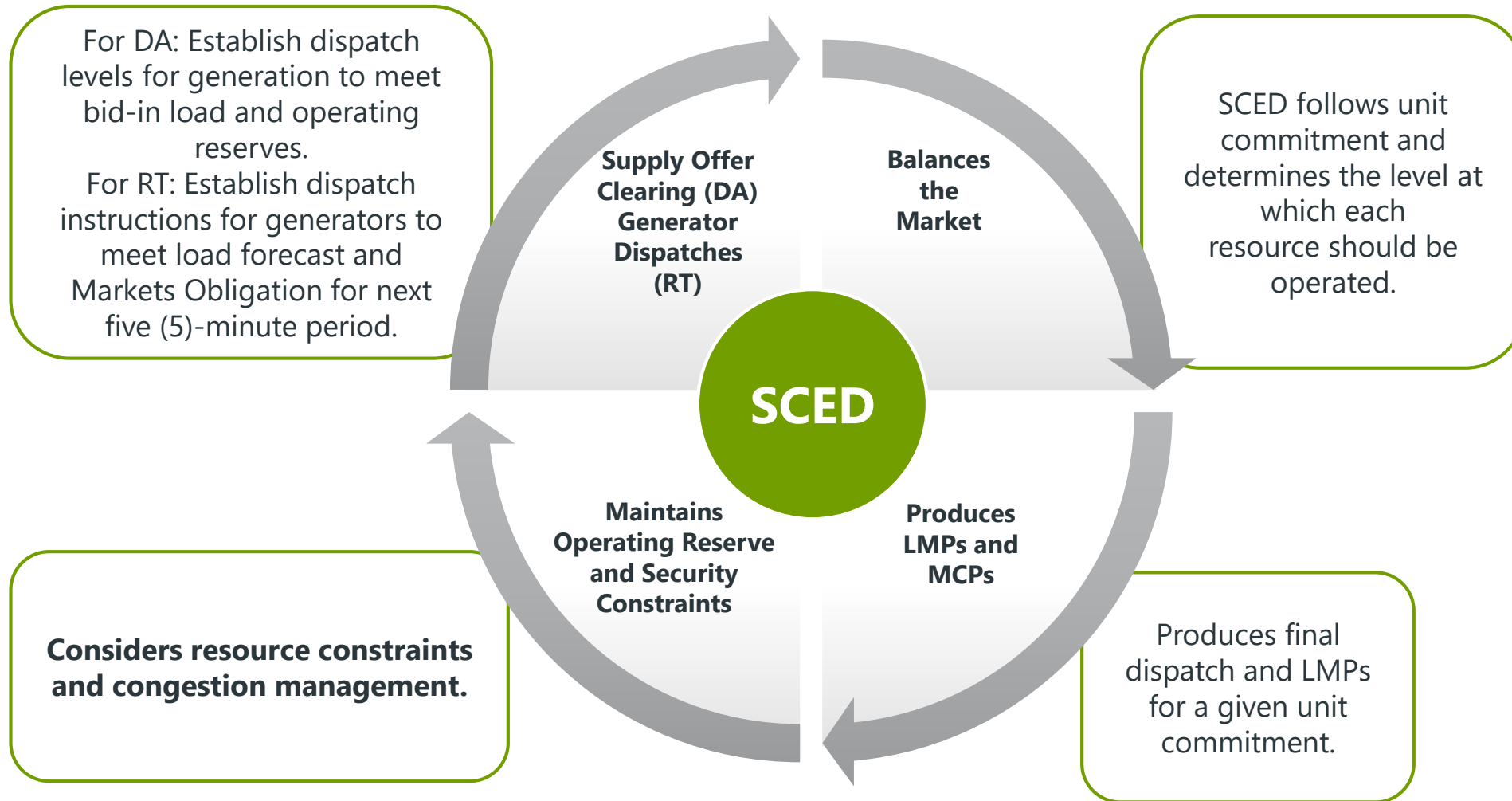
**SOLs/IROL/ WECC Paths**

# SEAMS COORDINATION OVERVIEW



# CONGESTION & PRICE FORMATION

# SECURITY CONSTRAINED ECONOMIC DISPATCH (SCED)



# SYSTEM CONGESTION: IMPACT ON LMP/MCP

- LMPs are computed to reflect the cost to supply the next incremental MW of Energy at each location, including the economic impact of congestion when it exists:
  - LMPs in a lossless congested system will have the following components:
    - **Energy Component:** the price of energy at reference bus, energy component same for all pricing locations
      - SPP and other markets use load-weighted reference bus
    - **Congestion Component:** value determined based on the congestion economic impact of a net injection at the pricing location

$$\text{LMP at Pricing Location} = \text{Energy Component} + \text{Congestion Component at that Pricing Location}$$

- Because of co-optimization, the Market Clearing Price (MCP) of any other market product may also be impacted by the economic impact of congestion, when it exists

# SCED FUNCTION: CONSTRAINT SHADOW PRICE

- A problem constraint can be associated with an economic impact value
- A potential change value of system production cost with respect to an incremental increase in limit on that constraint is known as the **constraint shadow price**
- For a given set of system solution variables, the following is true for any of the problem constraints:
  - When the constraint is **not binding**, its shadow price is **zero**
  - When the constraint is **binding** or **breached**, its shadow price is *typically non-zero*



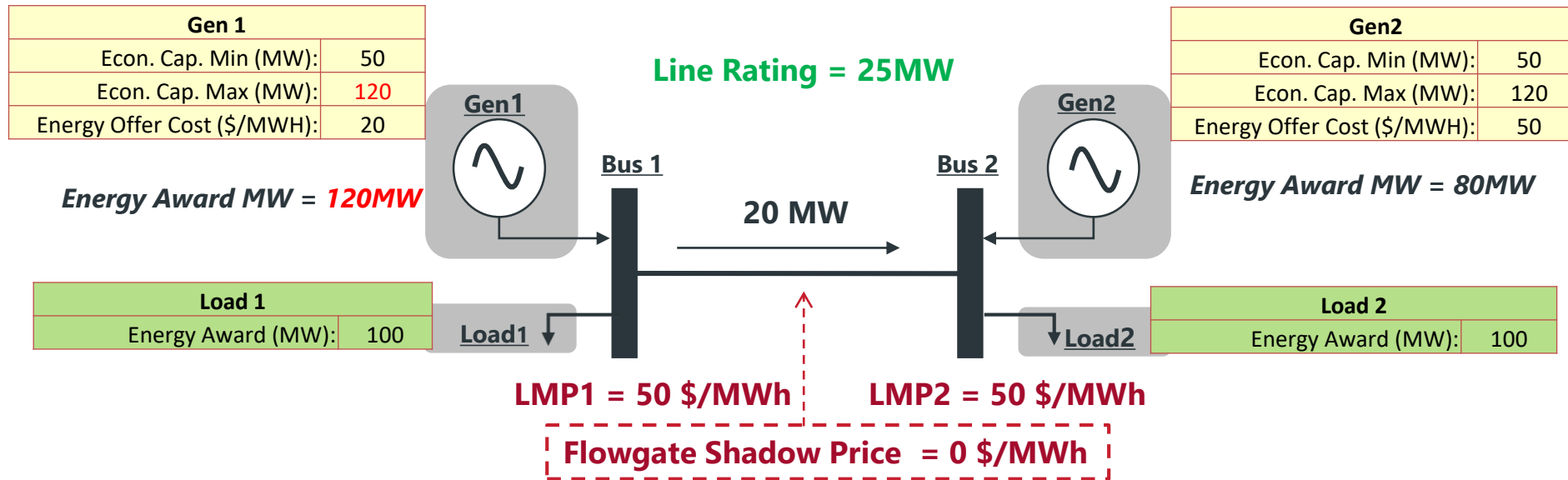
# SCED FUNCTION: SYSTEM CONGESTION

- When one or more transmission constraints are binding, the system is said to be congested
- System congestion results from the fact that the energy flow on one or more transmission constraints has reached the defined line maximum MW capability

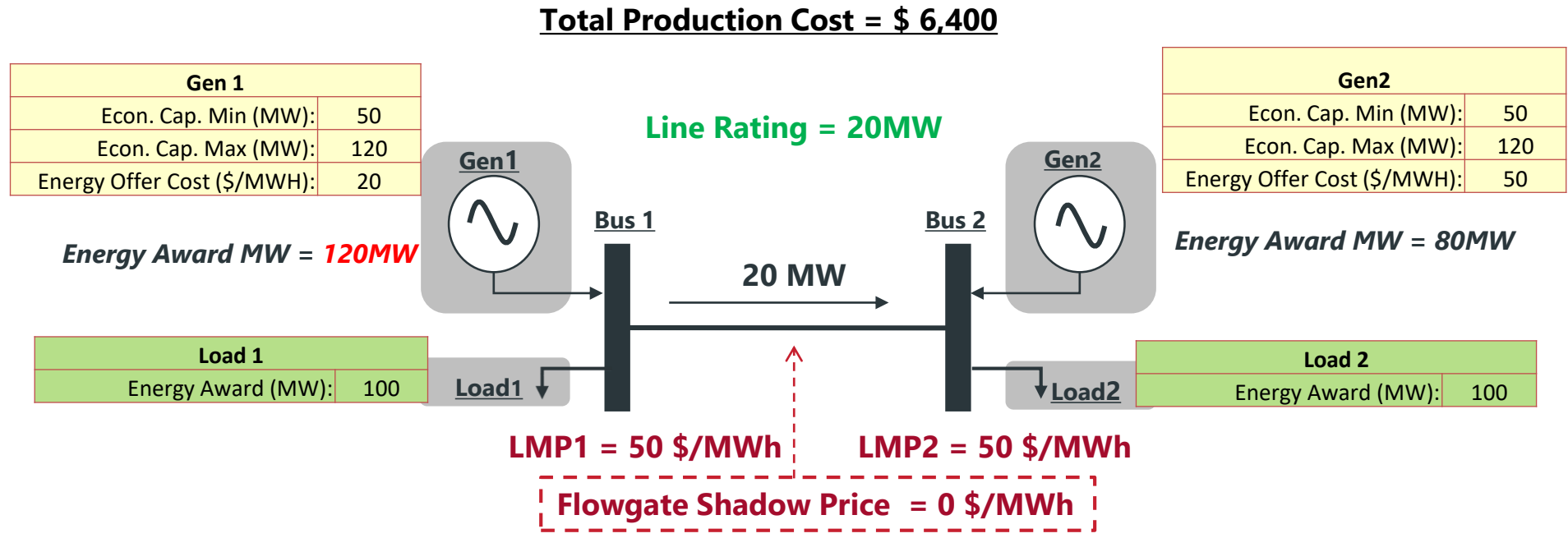
# TRANSMISSION CONGESTION COST EXAMPLE

NON BINDING CONSTRAINT

# System Congestion: No congestion



# System Congestion : Transmission Element at Limit - No congestion cost



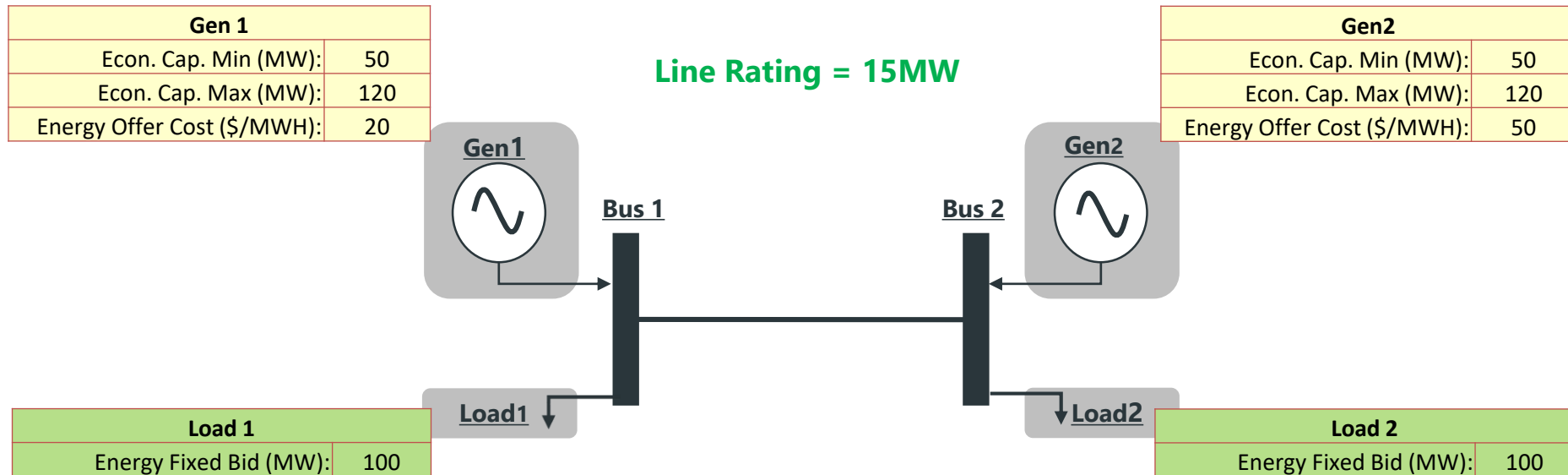
- When there is no congestion and no losses:
  - LMPs are uniform throughout the Market footprint,
  - An incremental change on the flowgate limit will not impact the market results
  - The shadow price of the flowgate constraint is zero
  - The system is dispatched in the most economic way possible and is not limited by transmission

$MEC = \text{Load weighted LMP} = \$50$   
 $MCC \text{ at Bus 1} = \$0$   
 $MCC \text{ at Bus 2} = \$0$

# TRANSMISSION CONGESTION COST EXAMPLE

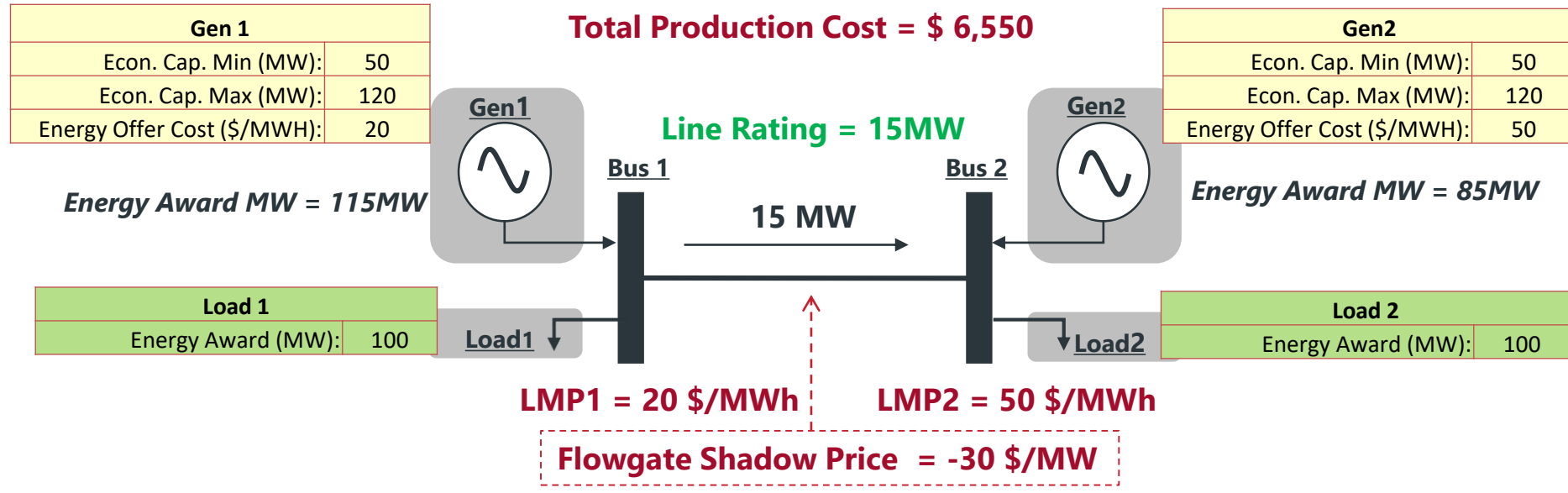
BINDING CONSTRAINT

# System Congestion : Energy Only – Binding Flowgate



- Let's determine for a 1-hour Market:
  - Each Market Participant Resource award (Energy)
  - Each Bus LMP
  - The market's total production cost
  - The flowgate shadow price
  - The congestion impact for each bus LMP based on the physical flow

# System Congestion : Energy Only – Binding Flowgate



- When there is congestion:
  - LMPs are reflective of the transmission limits
  - The shadow price of the flowgate constraint is **-30 \$/MW**.
  - What does that mean? Remember shadow price is **change in system production cost with respect to an incremental increase in limit on that constraint**

$MEC = \text{Load weighted LMP} = \$35$   
 $MCC \text{ at Bus 1} = (-\$15)$   
 $MCC \text{ at Bus 2} = (\$15)$

# QUESTIONS/DISCUSSION



# MARKETS



Afternoon Break

3:00 – 3:30



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# GENERAL SESSION IV CONGESTION RENT ALLOCATION

# AGENDA – GENERAL SESSION IV CONGESTION RENT ALLOCATION

Transmission Service Reservations – An Overview	
Congestion Hedging Principles	
Allocation of Congestions Rents – An Overview	
Allocation Methodology Examples	
Uplift	
Option vs. Obligation	
Timelines	
Questions/Discussion	
Next Steps	

# CONGESTION RENT ALLOCATION OVERVIEW

MICHA BAILEY

# TRANSMISSION SERVICE RESERVATIONS

AN OVERVIEW

# TRANSMISSION SERVICE RESERVATIONS

- **Transmission Service Reservations (TSR)s are Physical Transmission Rights**
- The objective of **TSRs** is to ensure the reliable delivery of Energy (from specific generators to loads) and Capacity, and.....
  - Mechanism to ensure that Load Serving Entities have Capacity Requirements met for Resource Adequacy
  - Provides compensation to Transmission Owners for the use of the transmission system
- **TSR** reserves a specific amount of
  - capacity in megawatts (MW)
  - across a specific transmission system path (*i.e. from A to B*)
  - for a given timeframe

# TYPES OF FIRM TSRs

- **Network Integrated Transmission Service (NITS)**

Delivery from a generation station (or stations) to a load settlement location

- **Firm Point-to-Point (FPTP)**

Delivery from a one location on the grid to another location on the grid.  
Today, used primarily for exports/imports into SPP

- **Grandfathered Agreements (GFAs)**

A pre-existing contractual agreement prior to SPP Tariff that is the network equivalent to NITS

- **Conditional Firm Service**

Treated as firm when specific conditions are met

# CONDITIONAL FIRM SERVICE DISCUSSION

## Transmission Service Reservation Priorities

Transmission Service Reservation Priorities		
Priority	Acronym	Name
0	NX	Next-hour Market Service
1	NS	Service over secondary receipt and delivery points
2	NH	Hourly Service
3	ND	Daily Service
4	NW	Weekly Service
5	NM	Monthly Service
6	NN	Network Integration Transmission Service from sources not designated as network resources
7	F	Firm Point-to-Point Transmission
	FN	Network Integration Transmission Service from Designated Resources



**Source 3**

**TC #1: Sink 1**

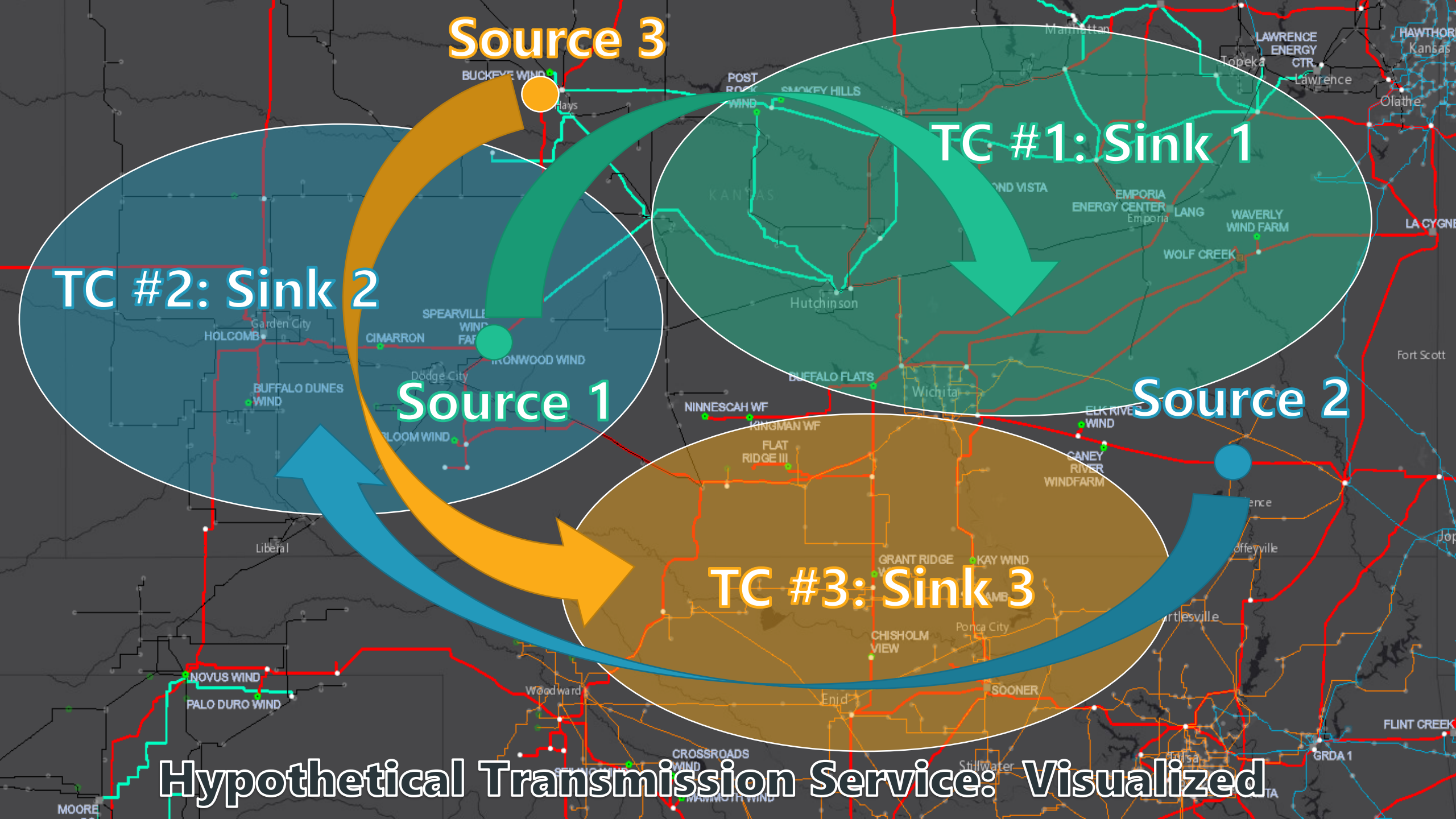
**TC #2: Sink 2**

**Source 1**

**Source 2**

**TC #3: Sink 3**

**Hypothetical Transmission Service: Visualized**



# CONGESTION HEDGING PRINCIPLES

THE BASICS

# WHY DO WE HAVE CONGESTION REVENUE?

- When elements on the transmission grid are at their limit, they can no longer support additional flow in power
- When this happens in an Energy Market, more expensive generation must be dispatched to provide displacement power to relieve this physical constraint and serve load
- As such, price separation occurs between total generation payments and total load charges. This separation occurs on either side of a congestion path (*see example*)

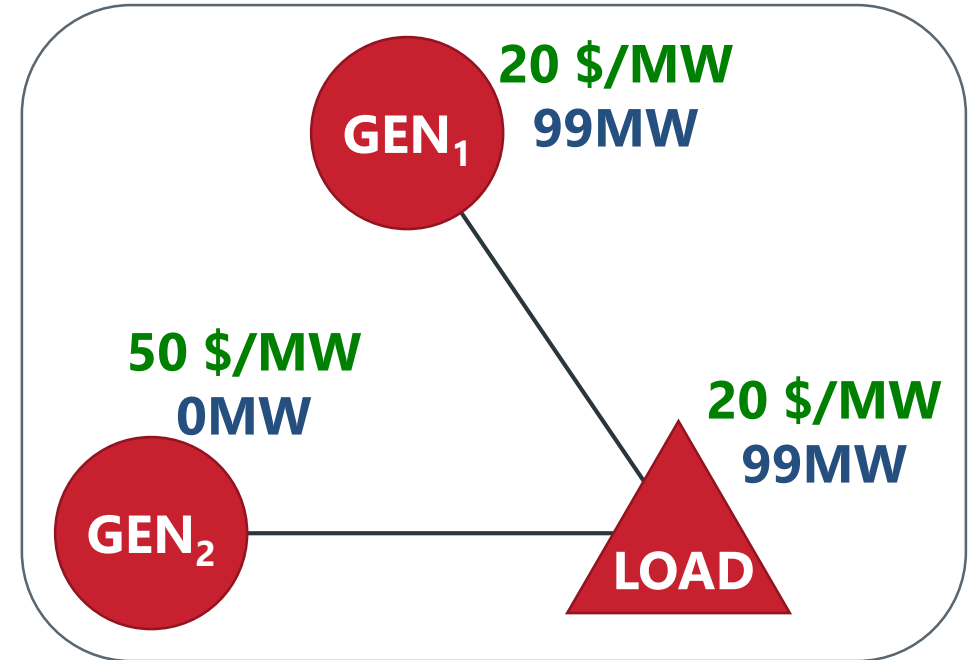
# CONGESTION AND PRICING

No Congestion:

- Money In = Money Out
- Net revenue = \$0

Example:

MP	Settled	Total
GEN <sub>1</sub>	\$20 x 99 MW	-\$1,980
GEN <sub>2</sub>	\$50 x 0 MW	-
LOAD	\$20 x 99 MW	\$1,980
<b>TOTAL</b>		<b>\$0</b>



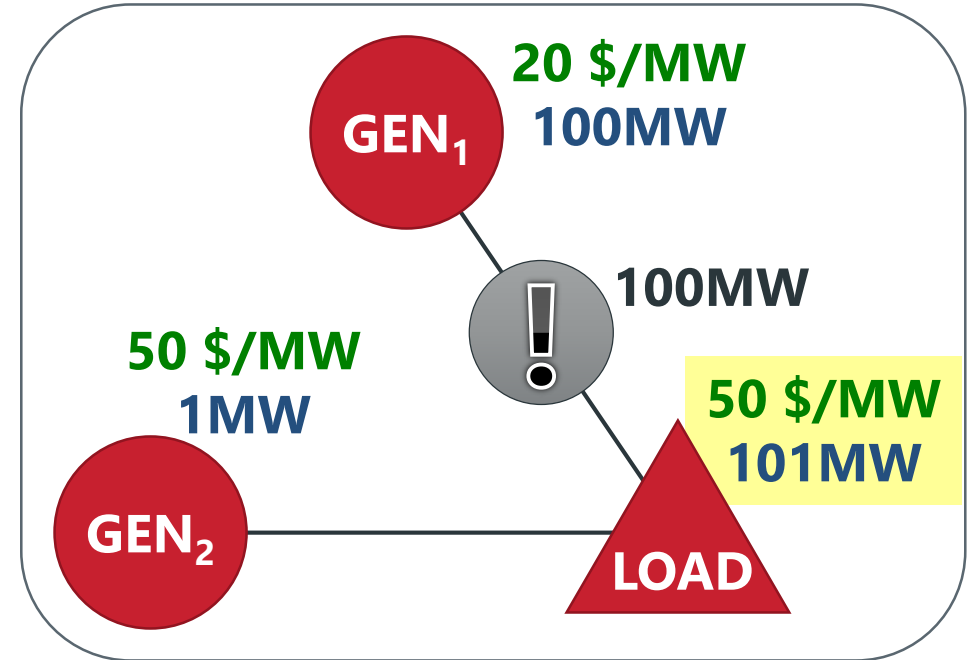
# CONGESTION AND PRICING

Congestion:

- Money In  $\neq$  Money Out
- \$3,000 Over-Collection

Example:

MP	Settled	Total
GEN <sub>1</sub>	\$20 x -100 MW	-\$2,000
GEN <sub>2</sub>	\$50 x -1 MW	-\$50
LOAD	\$50 x 101 MW	\$5,050
<b>TOTAL</b>		<b>\$3,000</b>



# ALLOCATION OF CONGESTION RENTS



Congestion in electricity can expose market participants to high energy costs

Owners of transmissions rights need to be protected from high energy costs

# BENEFITS OF CONGESTION RENT ALLOCATION

- Puts a value on firm Transmission Service Reservations (TSRs)
  - Provides compensation of Day-Ahead congestion rents based upon difference in Marginal Congestion Component (MCC)s at the Source and Sink locations
- Makes load indifferent from which generators are committed in the Day Ahead Market
- Hedges against volatility of the MCC of the Local Marginal Price (LMP)
  - Congestion can swing hour by hour

# ALLOCATION OF CONGESTION RENTS OVERVIEW

MARKETS+



# CONGESTION RENTS

## DA Congestion Rents

- Sum up all Generators
- Sum up all Loads
- Net out losses



Allocation of DA Congestion Rents

# ALLOCATION OF CONGESTION RENT COLLECTED

- Allocation, no market functions
  - No Simultaneous Feasibility Testing
- TSR Path based
  - Source, Sink, and MWs
- Allocation cap
  - Network = 103% \* (Average last three years of peak load)
  - PTP = MWs on PTP reservation

# ALLOCATION OF CONGESTION RENT COLLECTED

- No uplift calculations
  - What is collected, allocate back
- All positions will be options not obligations
  - Counter flow positions will have a value of \$0
- Allocation value determined as:
  - $$\frac{[\text{TSR MWs} * (\text{Source MCC} \text{ minus Sink MCC})]}{\text{Sum of Markets} + [\text{TSR MWs} * (\text{Source MCC} \text{ minus Sink MCC})]}$$

# ALLOCATION METHODOLOGY EXAMPLES

# ALLOCATION METHODOLOGY

- Allocation based all of MP's TSRs vs MP submitted TSRs
  - All of MP's TSRs
    - Congestion rent allocation based on prorata of all TSR paths up to allocation capacity
  - MP submitted TSRs
    - Outaged resources not eligible
    - Baseload schedules could be included
    - Allocate based on the full value of the path or prorata based on congestion rent collected? (Uplift discussion)

# ALLOCATION METHODOLOGY

- Example
  - 4 MPs
  - In this internal the market collected \$1,000
  - How will this be allocated?
    - $[\text{TSR MWs} * (\text{Source MCC} \text{ minus Sink MCC})] / \text{Sum of Markets} + [\text{TSR MWs} * (\text{Source MCC} \text{ minus Sink MCC})]$

# ALLOCATION METHOD EXAMPLE:

## MP SUBMITTED TSR V. ALL TSRS

Congestion Rent Collected = \$1,000

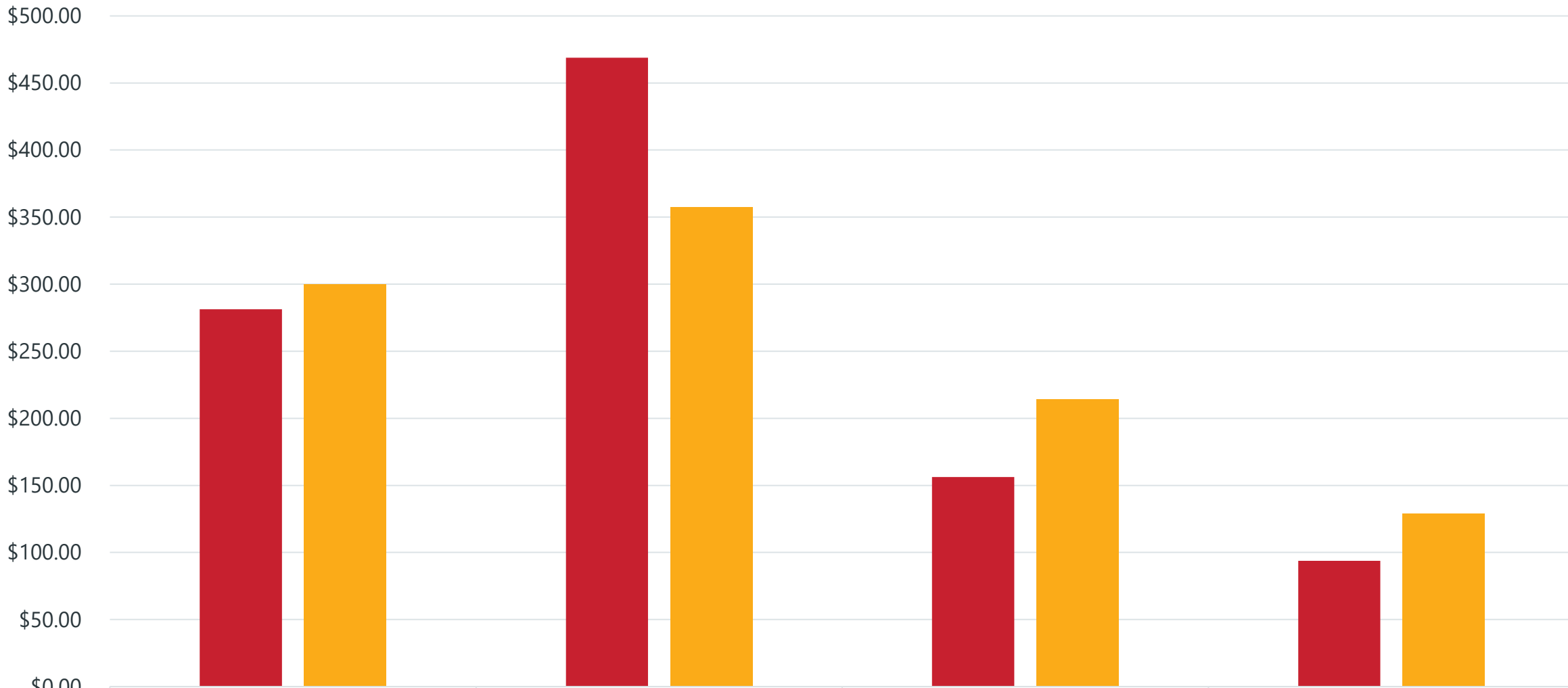
	TSR MWs	Allocation Cap	Source MCC Value	Sink MCC Value	MP Submitted TSR		All TSRs	
					MWs Chosen	Value	Ratio of MWs	Value
<b>MP1</b>		50						
TSR 1	50		5	10			25	-\$125
TSR 2	50		1	10	50	-\$450	25	-\$225
<b>MP 2</b>		50						
TSR 1	100		5	10			33.33	-\$166.67
TSR 2	50		5	20	50	-\$750	16.67	-\$250
<b>MP 3</b>		50						
TSR 1	100		5	10	50	-\$250	50	-\$250
<b>MP 4</b>		50						
PTP TSR 1	50		7	10		-\$150		-\$150
<b>SPP Total</b>						-\$1,600		-\$1,166.67

# ALLOCATION METHODOLOGY

- $[\text{TSR MWs} * (\text{Source MCC minus Sink MCC})] / \text{Sum of Markets} + [\text{TSR MWs} * (\text{Source MCC minus Sink MCC})]$
- MP 1 – Pick the Path
  - $50 * (1 - 10) = \$450 / \$1600 = 0.28125$
  - $0.28125 * \$1000 = \$281.25$
- MP 1 – All TSRs
  - $[25 * (5 - 10)] + [25 * (1 - 10)]$
  - $(\$125 + \$225) / \$1166.67 = 0.3$
  - $0.3 * \$1000 = \$300$



# Allocation Method Example



	MP 1	MP 2	MP 3	MP 4
■ MP Submitted Path	\$281.25	\$468.75	\$156.25	\$93.75
■ Full Set of TSRs	\$300.00	\$357.14	\$214.29	\$128.57

 Congestion Rent Collected = **\$1,000**

# ALLOCATION METHOD EXAMPLE:

## MP SUBMITTED TSR V. ALL OF MP'S TSRS

### MP Submitted TSRs

- Pros:
  - MPs are able to select which TSRs they deem valuable
- Cons:
  - Potentially less equitable in the long-term since allocation of congestion could favor MPs with higher valued TSRs
  - Implementation price goes up

### All of MP's TSRs

- Pros:
  - All TSRs are valued
  - Allocation essentially becomes a function of settlements
  - Cost to implement is less
- Cons:
  - MPs are unable to select which TSRs they deem valuable

# UPLIFT

# ALLOCATION OF CONGESTION RENT COLLECTED

## WITH AND WITHOUT UPLIFT

	Value	With Uplift			Without Uplift	
		Ratio	Money Paid to AO	Money Paid Back by AO	Ratio	Money Paid to AO
MP 1	-\$350	30%	\$350	\$50	30%	\$300
MP 2	-\$416.67	35.7%	\$416.67	\$59.67	35.7%	\$357
MP 3	-\$250	21.4%	\$250	\$36	21.4%	\$214
MP 4	-\$150	12.9%	\$150	\$21	12.9%	\$129
Total	-\$1,166.67		\$1,166.7	\$166.67		\$1,000
Congestion Rent	\$1,000					

# UPLIFT CALCULATION MWS VS VALUE

	MWs	Source MCC	Sink MCC	Value	Based on MWs		Based on Value	
					Ratio	Money Paid Back <b>by</b> AO	Ratio	Money Paid Back <b>by</b> AO
<b>MP 1</b>	25	5	10	-\$125	25%	\$41.67	30%	\$50
	25	1	10	-\$225				
<b>MP 2</b>	33.33	5	10	-\$166.67	25%	\$41.67	35.7%	\$59.50
	16.67	5	20	-\$250				
<b>MP 3</b>	50	5	10	-\$250	25%	\$41.67	21.4%	\$35.67
<b>MP 4</b>	50	7	10	-\$150	25%	\$41.67	12.9%	\$21.50
Total	200			-\$1,166.67		\$166.67		\$166.67
Congestion Rent				\$1,000				

# OPTION VS OBLIGATION

# OPTION VS OBLIGATION

- Option
  - Counterflow positions will be set to \$0 in the valuation of the allocation of congestion rents
- Obligation
  - Counterflow positions would pay in to bucket of congestion rents

Since the Markets+ construct is an Allocation of congestion rent and there are no market functions, obligations are unnecessary, therefore Markets+ will utilize options.

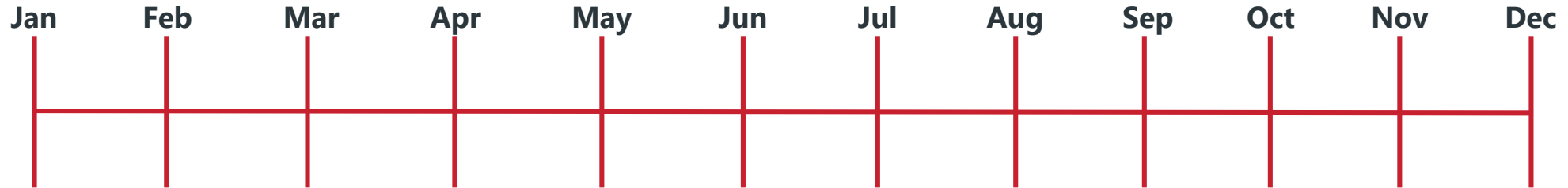
# TIMELINES



# TIME LINES

- Congestion Rent Allocation - Daily
- TSR submissions – Any increment from one year to daily
  - Benefits of doing **daily** is that firm service sold for that day could receive a portion of the congestion rents
    - Daily submissions would need to be coordinated with close of DAMKT
  - Benefits of doing **seasonally** or **monthly** is that the MP will only have to submit TSRs 4-12 times a year
- HPL submissions – Monthly

# TIME LINES



TSR Submissions & HPL Submissions at the start of every month  
12 times a year



TSR Submissions everyday  
365 times a year

# QUESTIONS/DISCUSSION

# NEXT STEPS

# RECEPTION

## 5:30 – 6:30

DOUBLETREE HOTEL  
83 E. 120<sup>TH</sup> AVE., THORNTON

# MARKETS



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