Consolidated EIM Initiatives Straw Proposal

Stakeholder Meeting

August 7, 2017

Megan Poage & Don Tretheway

Market Design & Policy

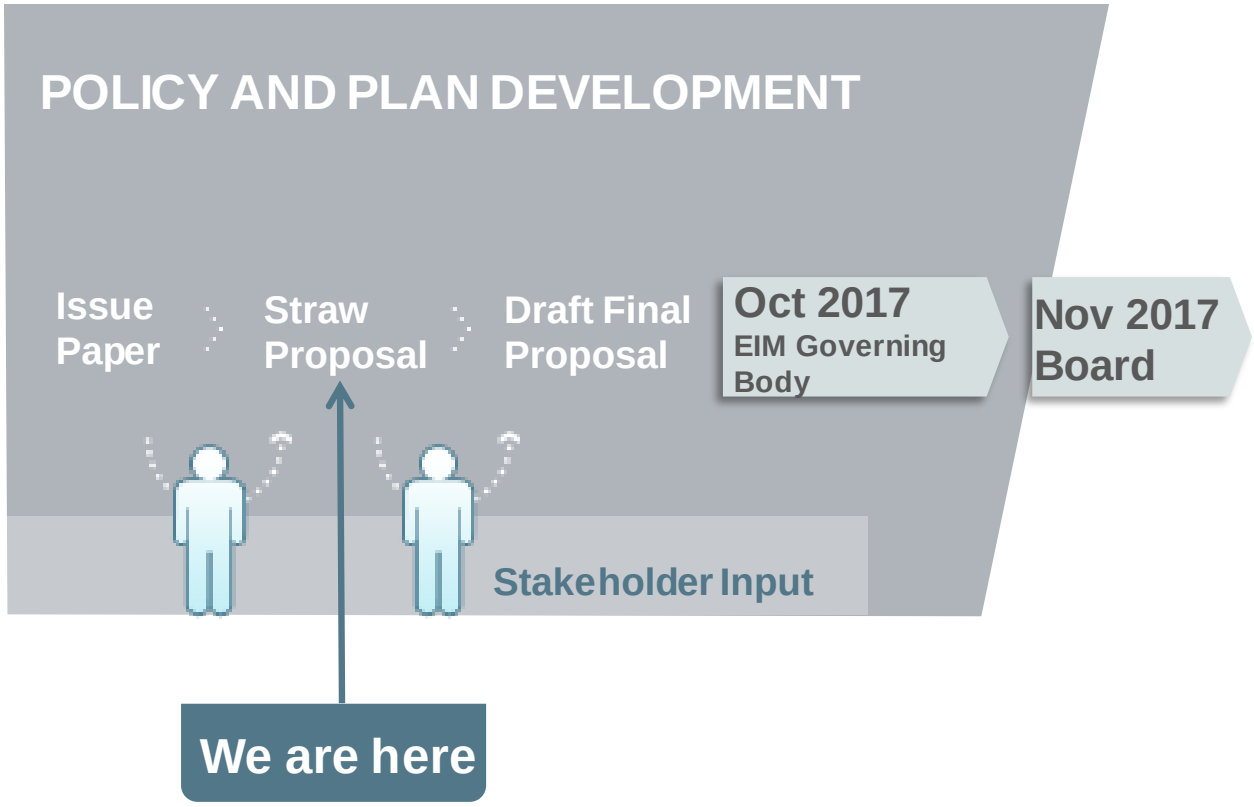
Agenda

Time	Topic	Presenter
10:00 – 10:15	Introduction and Purpose	Kristina Osborne
10:15 – 10:30	**Third Party Transmission Contribution**	Megan Poage
10:30 – 12:00	**Management of Bilateral Schedule Changes**	Don Tretheway
12:00 – 1:00	Break	
1:00 – 2:30	**Equitable Sharing of Wheeling Benefits**	Megan Poage
2:30 – 2:50	**New EIM Functionalities**	Megan Poage & George Angelidis
2:50 – 3:00	Next Steps	Kristina Osborne

Consolidated EIM Initiatives

INTRODUCTION AND PURPOSE

ISO Policy Initiative Stakeholder Process



Plan for stakeholder engagement

Milestone	Date
Post Issue Paper	June 13, 2017
Stakeholder Conference Call	June 20, 2017
Stakeholder Written Comments Due	June 30, 2017
Post Straw Proposal	July 31, 2017
Stakeholder Meeting	August 7, 2017
Stakeholder Written Comments Due	August 17, 2017
Post Draft Final Proposal	September 5, 2017
Stakeholder Conference Call	September 12, 2017
Stakeholder Written Comments Due	September 19, 2017
EIM Governing Body Meeting	October 10, 2017
Board of Governors Meeting*	November 1-2, 2017

*November 2017 is the target date for the Board of Governors Meeting. It is not a requirement for all 3 initiatives in this consolidated effort to go to the board at the same time.

EIM Governing Body – **E1 classification** (Primary Authority)

- EIM Governing Body has primary authority for considering and approving policy changes to market rules that would not exist but for the EIM.

- "For a policy initiative involving market rules changes that fall ***entirely*** in the EIM Governing Body's primary authority, the matter goes to the EIM Governing Body for approval, and then to the consent agenda of the next Board meeting."

http://www.caiso.com/Documents/GuidanceforHandlingPolicyInitiatives-EIMGoverningBody.pdf

Purpose of this initiative is to consolidate EIM related items into one effort

- Items in this initiative:
  - Third Party Transmission Contribution
  - Management Bilateral Schedule Changes
  - Equitable Sharing of Wheeling Benefits
  - New EIM Functionalities

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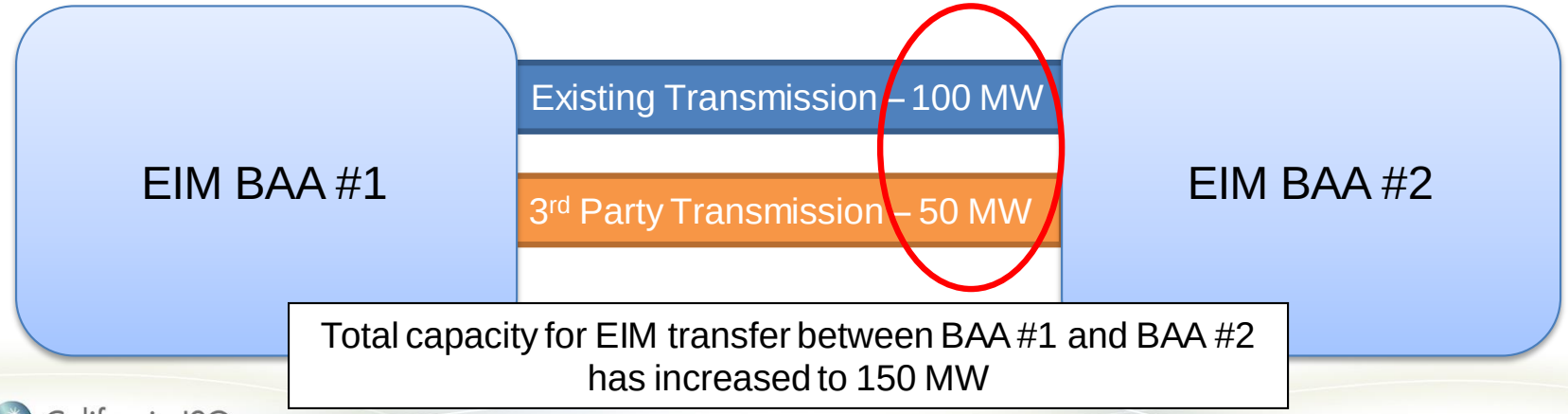
THIRD PARTY TRANSMISSION CONTRIBUTION

Third Party Transmission Contribution background information

- Currently, EIM transfers occur on transmission provided by EIM entities.

- Non EIM entities have expressed interest to contribute transmission located between EIM BAAs for use in the EIM markets.



Majority of stakeholder feedback indicated this functionality would not be widely used or beneficial

- Congestion revenues may not be adequate compensation
- Functionality does not provide sufficient value
- Concern that implementation cost will outweigh benefits
- Not an efficient use of ISO resources

Third Party Transmission Contribute **removed from scope**

- Based on stakeholder feedback, the ISO has removed this from the scope of the Consolidated EIM Initiatives

- Reference Issue Paper for details on the original problem statement, scope, and proposed solutions

The Consolidated EIM Initiatives Issue Paper is located at: http://www.caiso.com/Documents/IssuePaper-ConsolidatedEnergyImbalanceMarketInitiatives_Updated.pdf

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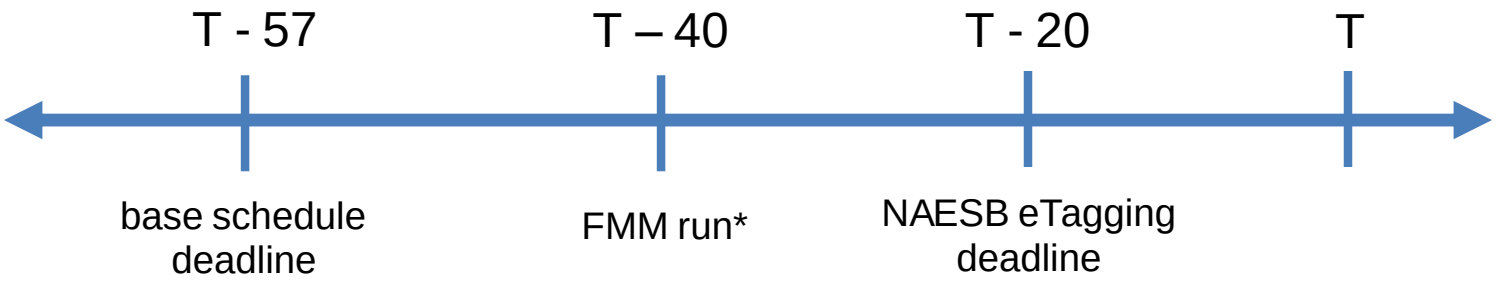
MANAGEMENT OF BILATERAL SCHEDULE CHANGES

Management of bilateral schedule changes background information

- Schedule changes not reflected in base schedules are exposed to real-time imbalance settlement
- Risk of imbalance settlement **unknown** at time of schedule change
- Issue Paper contemplated use of wheeling functionality to express bid price to accept schedule change

Majority of stakeholder feedback was neutral – functionality is desired but proposal does not address fundamental issue of ability to hedge



- Prior to EIM, firm transmission holders could make schedule changes with no settlement implication up to the NAESB eTagging deadline of T-20

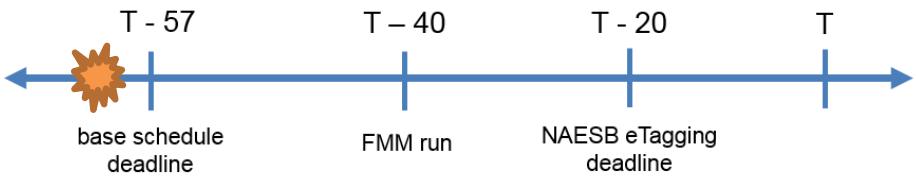
*FMM run starts at T-37.5 however eTags must be submitted and approved by T-40 for data to be fed into the market

Understanding the issue – how the ISO markets manage congestion

- ISO market is aware of schedule change **before** FMM run
  - Results in fifteen minute (FMM) settlement

- ISO market is aware of schedule change **after** FMM run
  - Results in real time dispatch (RTD) settlement

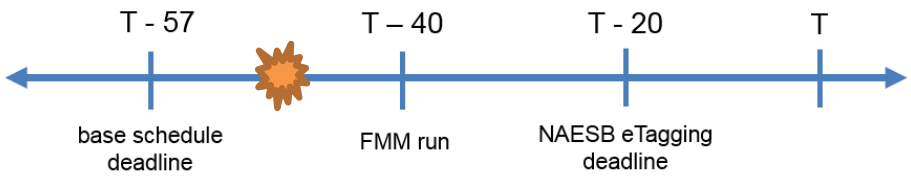
Bilateral schedule submitted before T-57



	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12
Market	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- Schedule finalized prior to EIM entity base schedule deadline
  - No imbalance settlement

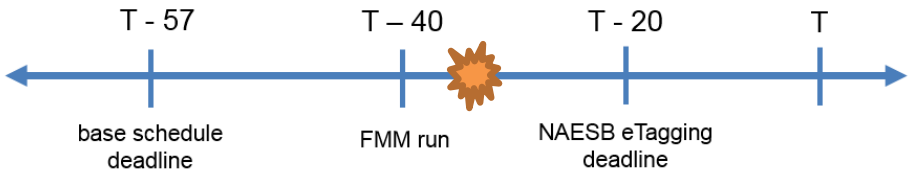
Bilateral schedule submitted between T-57 & T-40



	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12
Market	FMM	FMM	FMM	FMM	FMM	FMM	FMM	FMM	FMM	FMM	FMM	FMM

- Base schedule change known to market operator prior to first FMM run
  - Settled at FMM price for hour T

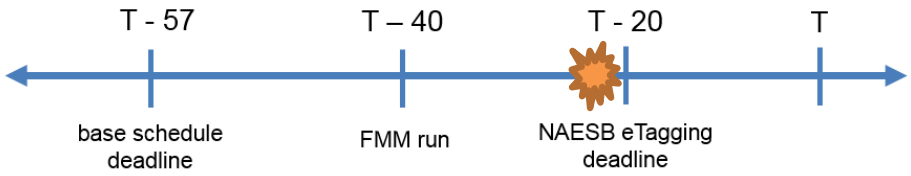
Bilateral schedule submitted between T-40 & T-25



	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12
Market	RTD	RTD	RTD	FMM	FMM	FMM	FMM	FMM	FMM	FMM	FMM	FMM

- Base schedule change <u>not</u> known to market operator prior to first FMM run
  - Settled at RTD price for Int 1 – Int 3
  - Settled at FMM price for Int 4 – Int 12

Bilateral schedule submitted between T-25 & T-20

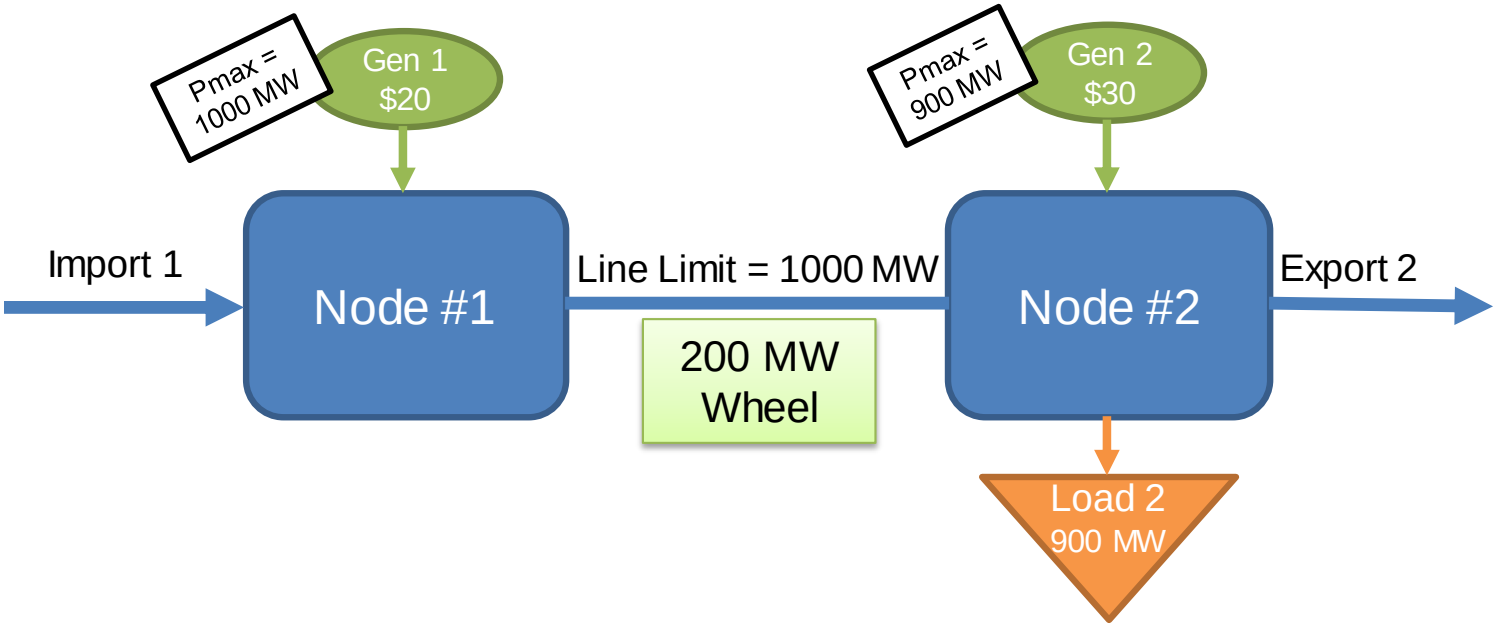


	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12
Market	RTD	RTD	RTD	RTD	RTD	RTD	FMM	FMM	FMM	FMM	FMM	FMM

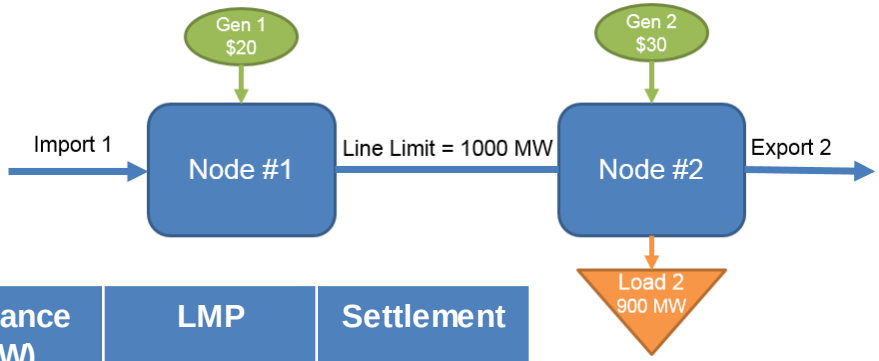
- Base schedule change <u>not</u> known to market operator prior to first or second FMM run for hour T
  - Settled at RTD price for Int 1 – Int 6
  - Settled at FMM price for Int 7 – Int 12

Managing exposure to re-dispatch costs through EIM entity OATT - example

- Re-dispatch cost occurs when a wheel results in congestion



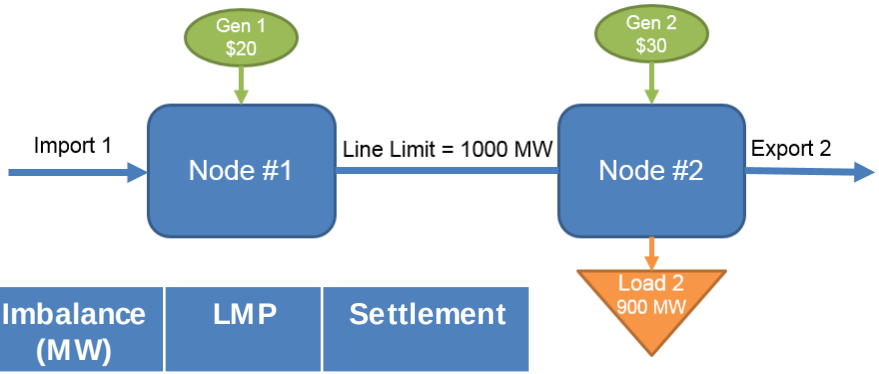
Example 1 - Wheel known before T-57



	Base (MW)	Dispatch (MW)	Imbalance (MW)	LMP	Settlement
Gen 1	800	800	0	$20	-
Gen 2	100	100	0	$30	-
Load 2	900	900	0	$30	-
Import 1	200	200	0	$20	-
Export 2	200	200	0	$30	-
				RTCO	-

- Wheel known before T-57
  - EIM entity ensures G1 does not overload transmission line
  - No re-dispatch will be required

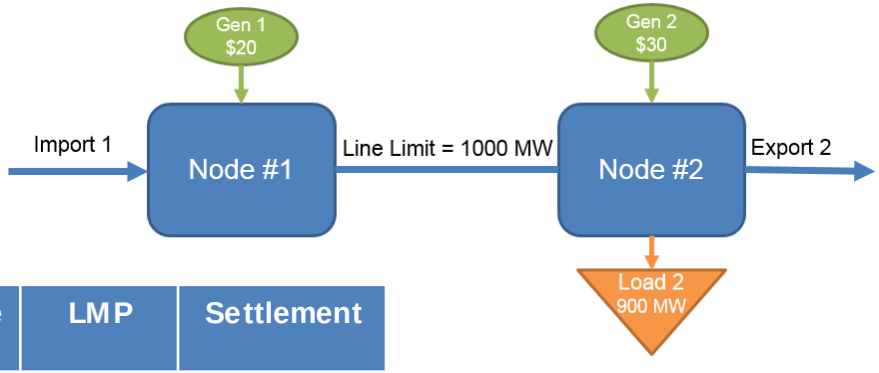
Example 2a - Wheel known between T-57 and T-40 EIM entity takes action



	T-57 Base (MW)	T-40 Base (MW)	Dispatch (MW)	Imbalance (MW)	LMP	Settlement
Gen 1	900	800	800	0	$20	-
Gen 2	0	100	100	0	$30	-
Load 2	900	900	900	0	$30	-
Import 1	0	200	200	0	$20	-
Export 2	0	200	200	0	$30	-
					RTCO	-

- Final schedule not submitted by T-57
  - EIM entity adjusts G1 & G2 schedules to not overload transmission line
  - No re-dispatch required

Example 2b - Wheel known between T-57 and T-40 EIM entity takes **no** action



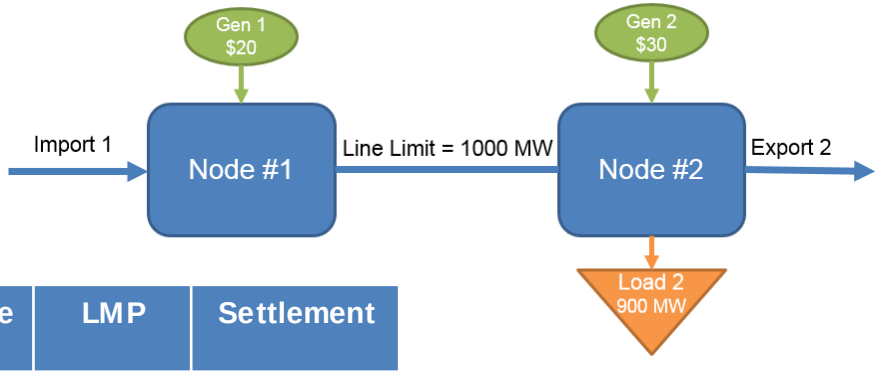
	T-57 Base (MW)	T-40 Base (MW)	Dispatch (MW)	Imbalance (MW)	LMP	Settlement
Gen 1	900	900	800	-100	$20	$2,000
Gen 2	0	0	100	100	$30	-$3,000
Load 2	900	900	900	0	$30	-
Import 1	0	0	200	200	$20	-$4,000
Export 2	0	0	200	200	$30	$6,000
					RTCO	$1,000

← Re-dispatch costs

← Congestion revenue from wheel

- EIM entity does not notify ISO before ISO base schedule deadline
  - Market must re-dispatch to allow wheel because EIM entity did not update base schedules

Example 3a - Wheel known after T-40 EIM entity takes action

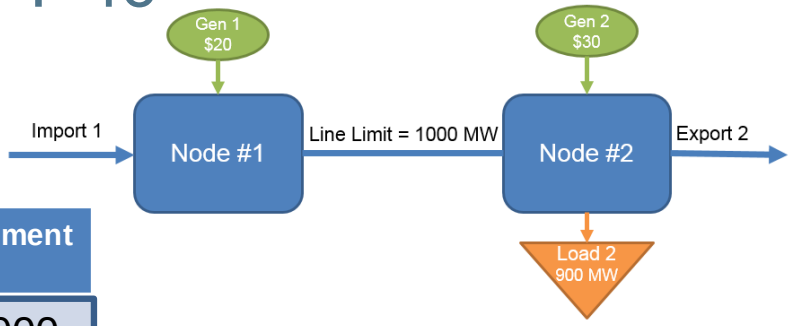


	T-57 Base (MW)	Dispatch (MW)	Imbalance (MW)	LMP	Settlement
Gen 1	800	800	0	$20	-
Gen 2	100	100	0	$30	-
Load 2	900	900	0	$30	-
Import 1	0	200	200	$20	-$4,000
Export 2	0	200	200	$30	$6,000
				RTCO	$2,000

← Congestion revenue from wheel

- EIM entity does not allow G1 base schedule to exceed transmission assuming wheel can tag up until T-20
  - Leaves room for wheel (if it is scheduled)
  - Wheel still results in congestion, but this is $2000 congestion revenue (could be used to provide the perfect hedge)

Example 3b - Wheel known after T-40 EIM entity takes **no** action



	T-57 Base (MW)	Dispatch (MW)	Imbalance (MW)	LMP	Settlement
Gen 1	900	800	-100	$20	$2,000
Gen 2	0	100	100	$30	-$3,000
Load 2	900	900	0	$30	-
Import 1	0	200	200	$20	-$4,000
Export 2	0	200	200	$30	$6,000
				RTCO	$1,000

← Re-dispatch costs

← Congestion revenue from wheel

- EIM entity allows G1 base schedule to use wheel transmission
  - Re-dispatch required because transmission for wheel was not reserved
  - Congestion wheel revenue can provide perfect hedge
  - Re-dispatch costs would result in an RTCO charge

EIM entity can provide the perfect hedge for bilateral schedule changes using firm transmission up until T-20

- If schedule changes not exposed to imbalance settlement, re-dispatch costs occur:
  - EIM entity does not reserve the transmission by not allowing other base schedules to use transmission
  - EIM entity does not notify ISO before T-40 of schedule change

BREAK

12:00PM – 1:00PM

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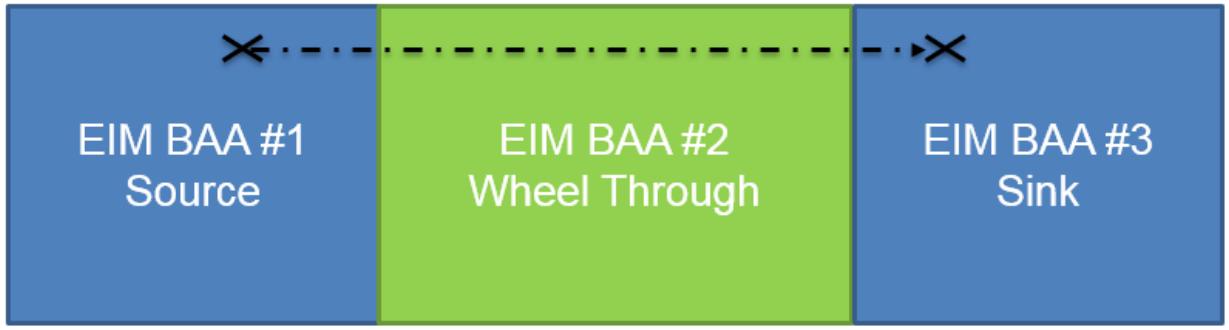
EQUITABLE SHARING OF WHEELING BENEFITS

Equitable Sharing of Wheeling Benefits background information

- EIM BAAs “in the middle” receive no direct financial benefit for facilitating wheeling transactions

- Should the source and sink accrue all benefits or should they be shared with the entity that facilitated the transfer?



Stakeholder feedback **in favor** of sharing wheeling benefits to compensate for transmission recovery

- Compensation for transmission use, not specifically sharing benefits, is essential to address the issues of:
  - Cost recovery for flows caused by EIM dispatches.
  - Preventing market distortions arising from discounted transmission pricing in any one temporal market and not the others.
  - Preventing the problem of a "free rider."
  - Cost shifts among transmission owners and customers due to reduced transmission revenues.

ISO Response:
Compensation for transmission recovery will not be addressed in this initiative and may considered in a future initiative.

Stakeholder feedback **against** sharing wheeling benefits

- Sufficient value has not been demonstrated:
  - BAA's in the "middle" receive benefits realized in other cases
  - Entities would lose the incentive to make additional investments in resources that can be dispatched in the EIM
  - Rate pancaking/hurdle rate could ultimately result in market inefficiencies and decrease in overall EIM benefits
    - Undermines principle of reciprocity
  - Reduction in liquidity will inhibit economic flow and ultimately be disruptive to the market as a whole

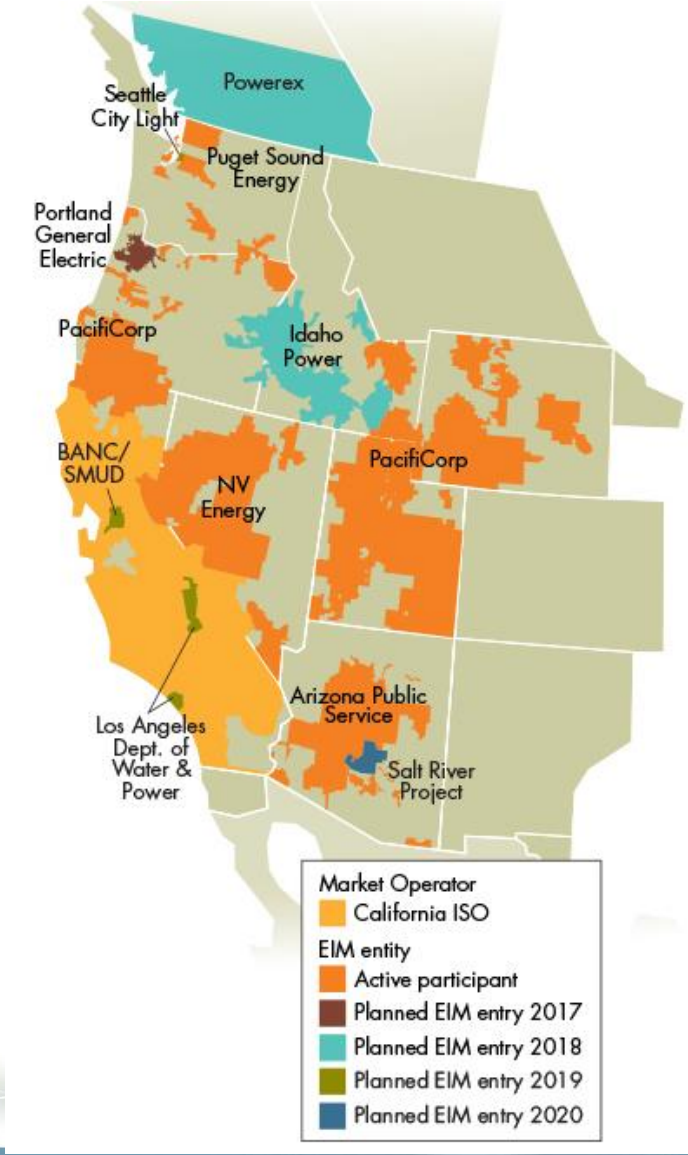
ISO Response:
Data analysis merits further investigation and policy proposal

Stakeholder feedback data request

- Determine the net benefit of facilitating a wheel-through transaction
- Quantify benefits that this initiative would yield
- Determine what benefit to the market design this would provide

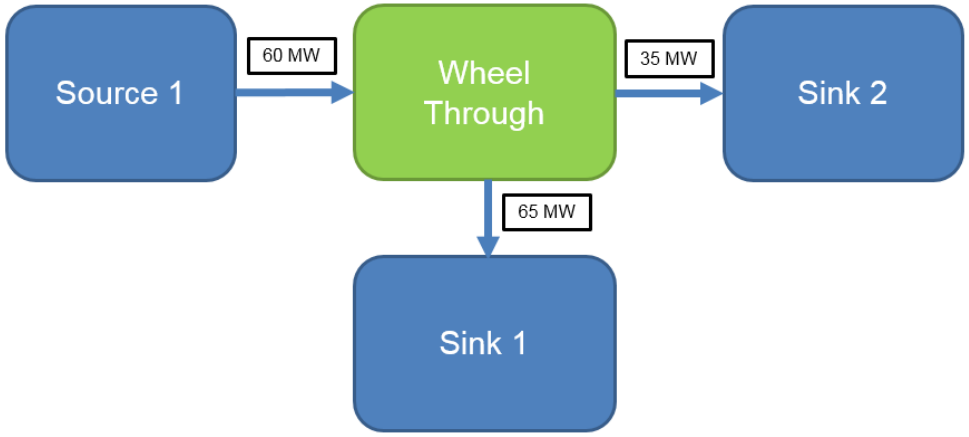
ISO Response:
Data analysis completed to determine net benefit of wheeling in comparison to importing/exporting. Equitable sharing of benefits maximizes the amount of transmission available to support EIM transfers.

Net wheeling will increase as the EIM footprint expands



Methodology for data analysis

- **Wheel through transaction** = minimum of the EIM transfers into or EIM transfers our of a BAA for a given interval
- **Net EIM transfers in** = sum of EIM transfers in minus wheels
- **Net EIM transfers out** = sum of EIM transfers out minus wheels



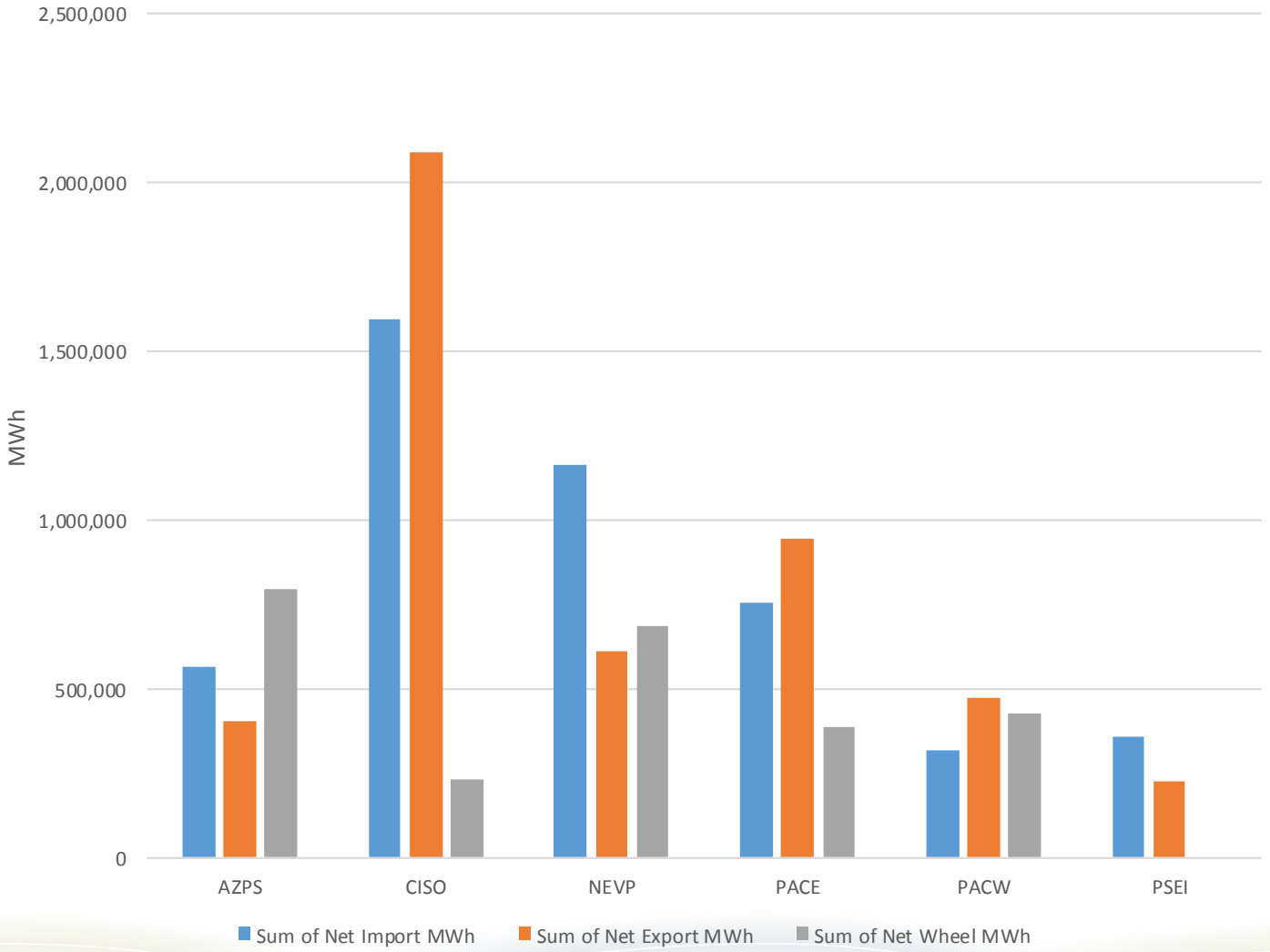
Sum of transfers in = 60 MW
Sum of transfers out = 100 MW

Wheel = 60 MW

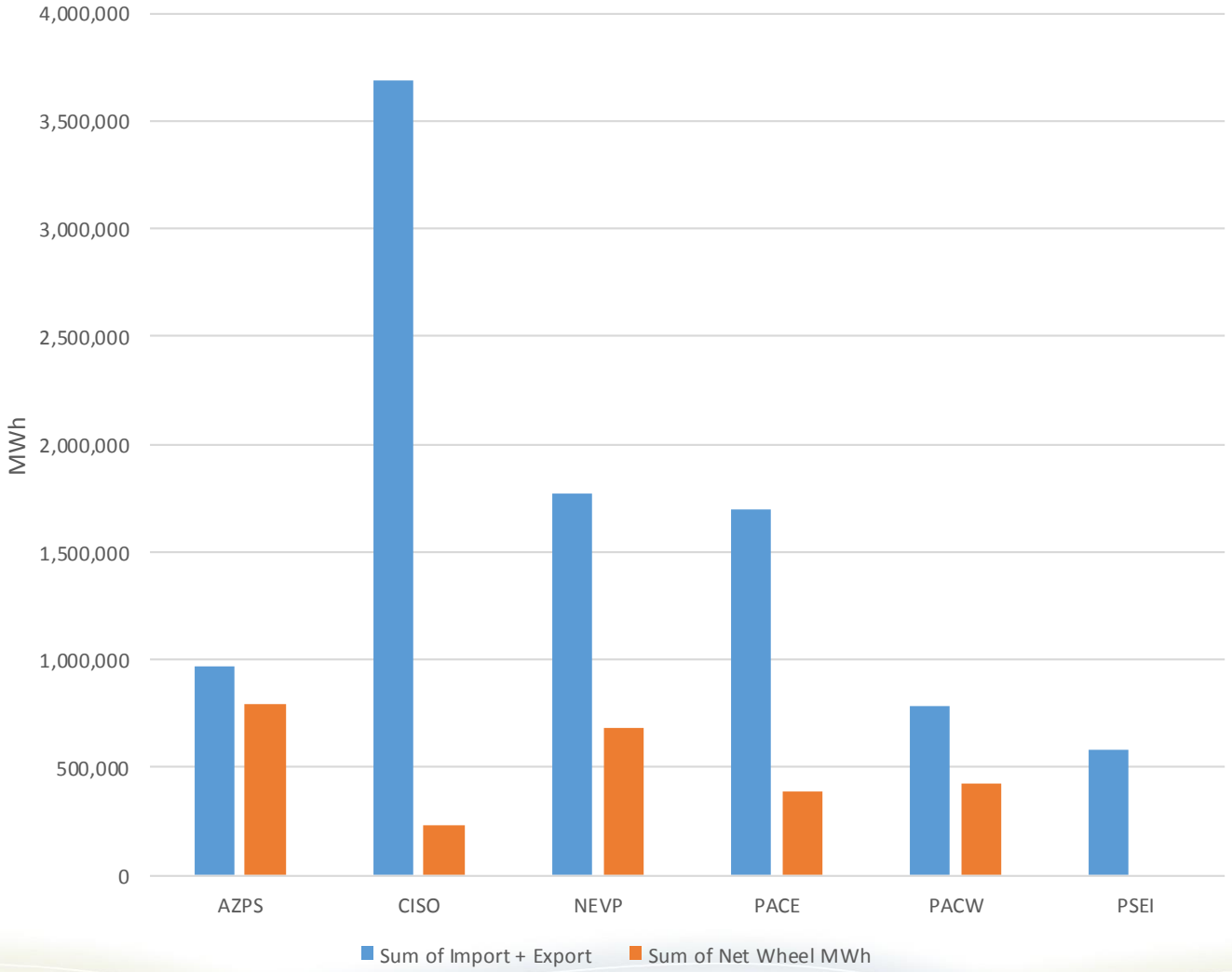
Net transfers in = 0 MW
Net transfers out = 40 MW

Note: The terms “Import(s)” and “Export(s)” are used in future slides in reference to “EIM transfer(s) in” and “EIM transfer(s) out” respectively.

Data summary: total net imports, total net exports & wheels by BAA



Data summary: total net imports + total net exports vs. wheels by BAA



Data summary: sum of net imports + net exports in comparison to wheeling transactions by BAA

EIM Entity	Sum of Import + Export (MWh)	Net Wheel (MWh)	%Wheels/Total Transactions
AZPS	964,231	795,203	45.20%
CISO	3,686,118	229,658	5.86%
NEVP	1,774,096	685,275	27.86%
PACE	1,699,360	385,034	18.47%
PACW	785,986	427,925	35.25%
PSEI	581,972	0	0.00%

The ISO proposes two options for equitable sharing of benefits and **requests additional stakeholder feedback**

1. Ex-post payment based on the amount of net wheeling that occurs

2. Hurdle rate that can be incorporated into the market

Proposal #1: Ex-post payment for net wheeling

1

- Collect and distribute funds based on the amount of net wheeling that occurs

- Net settlement is compensation minus cost allocation

Total Wheel Charge = Total Wheeling Transactions * Defined Rate

Compensation = % of Wheeling Transactions * Total Wheel Charge

Cost Allocation = % (Imports + Exports) * Total Wheel Charge

Example of ex-post payment for net wheeling (1 of 2)

1

- Net Imports + Net Exports and Total Wheels from November 2016 – July 2017 as % of total

EIM Entity	Total Net Import/Export		Total Net Wheel	
	MWh	% of Total	MWh	% of Total
AZPS	964,231	10.16%	795,203	31.52%
CISO	3,686,118	38.83%	229,658	9.10%
NEVP	1,774,096	18.69%	685,275	27.16%
PACE	1,699,360	17.90%	385,034	15.26%
PACW	785,986	8.28%	427,925	16.96%
PSEI	581,972	6.13%	0	0.00%
Total:	9,491,763	100.00%	2,523,095	100.00%

Example of ex-post payment for net wheeling (2 of 2)

1

- Uses a defined rate of $1
- Total Wheel Charge = 2,523,095 MW * $1

AZPS Cost Allocation = 10.16% of total import + export transactions * Total Wheel Charge

EIM Entity	Cost Allocation	Compensation	Net
AZPS	$256,346	$795,203	$538,857
CISO	$979,970	$229,658	-$750,312
NEVP	$471,566	$685,275	$213,709
PACE	$451,634	$385,034	-$66,600
PACW	$208,912	$427,925	$219,013
PSEI	$154,666	$0	-$154,666
Total:	$2,523,095	$2,523,095	$0

Pros and cons of ex-post settlement for distribute benefits from net wheeling

1

PROS

- Does not impact energy prices

- Is not a hurdle rate

CONS

- The ISO would be averaging the relative benefit over the entire footprint across all dispatch intervals

The ISO is requesting stakeholder feedback on ex-post settlement for net wheeling

1

- What defined rate would be used?
- Over what time period would the net settlement occur?
- Is this methodology favored by stakeholders?

Comments?

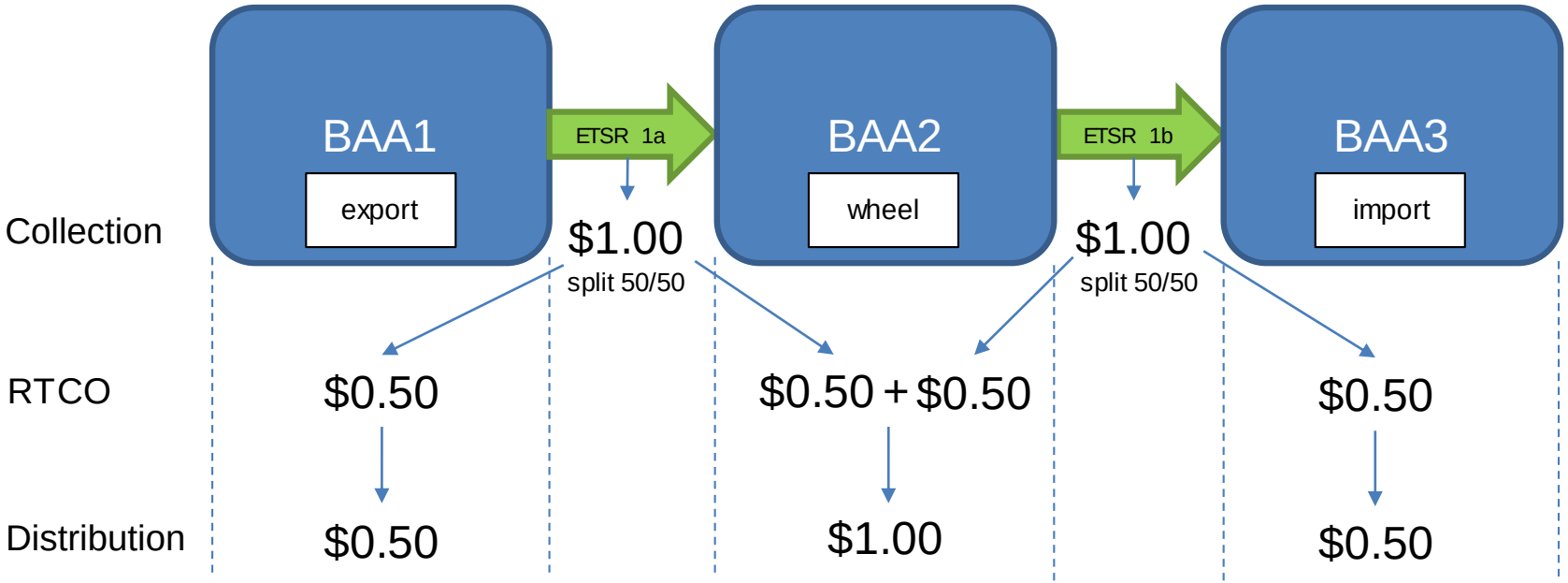
Proposal #2: Hurdle rate incorporated into the market 2

- Collect funds through the EIM transfer cost
  - Currently set at $0.01 to minimize the number of eTags used
- Distribute benefits through the real-time congestion offset
- Use predefined split (likely 100/0 or 50/50)

Example 2a: collection and split distribution of benefits through EIM transfer cost similar to congestion revenue

2a

- 50/50 split, transfer cost of $1/MWh

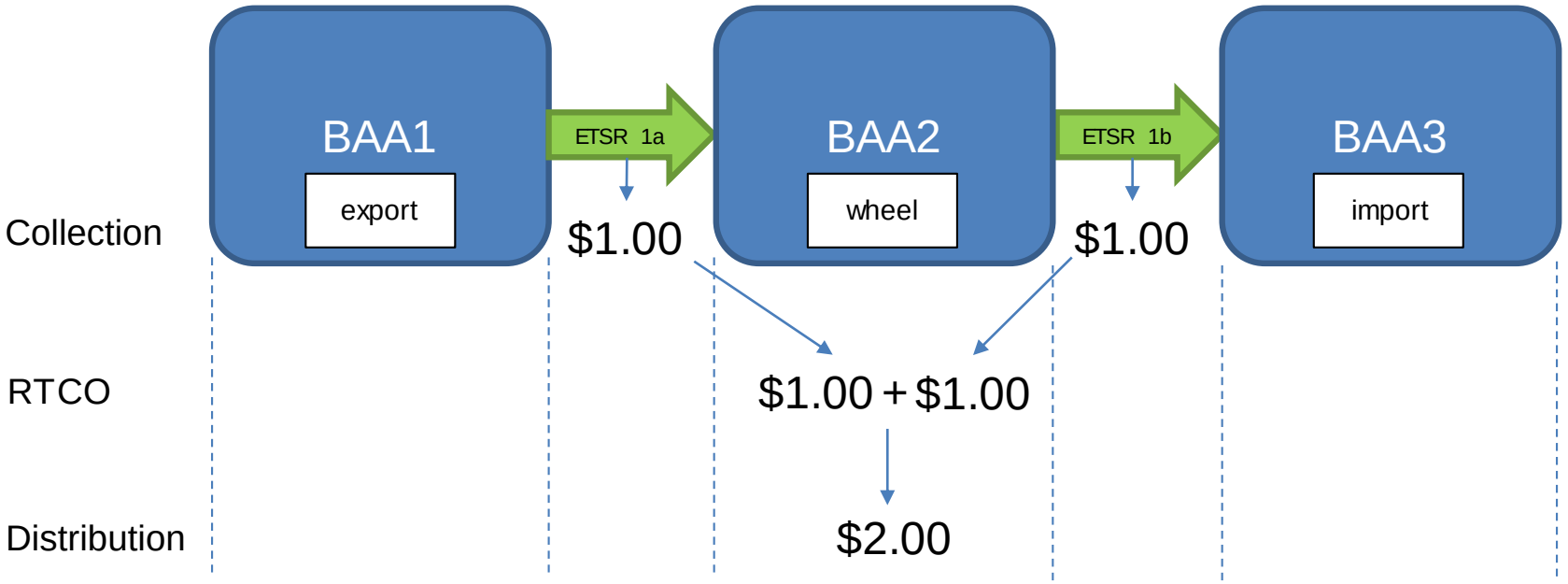


- Assumes the same distribution but another option would be to give all benefits to BAA2 (see example 2b)

Example 2b: collection and distribution of all benefits to wheel BAA through EIM transfer cost

2b

- Do not split EIM transfer costs similar to congestion revenue. Would require new charge code.



Pros and cons of using EIM transfer cost to distribute benefits from net wheeling

2

PROS

- Funding for net wheeling is coming out of the market run through the imbalance settlement

- Leverages existing EIM transfers and RTCO functionality

CONS

- Hurdle rates are generally not favored market design features

The ISO is requesting stakeholder feedback on incorporating a hurdle rate in the market

2

- Value of the EIM transfer cost?
  - How is the value of the EIM transfer cost determined?
  - Is it determined by the ISO or individual EIM BAAs?

- Should EIM transfer cost vary by EIM transfer location to encourage competition?

- Is this methodology favored by stakeholders?

Comments?

Consolidated EIM Initiatives

NEW EIM FUNCTIONALITIES

Automated matching of import/export schedule changes with a single EIM non-participating resource

- Auto-adjustment of non-participating resource schedules to match import or export schedule changes after T-40
- Eliminates the need for EIM BAA Operator to issue manual dispatch instructions to the non-participating resource
- Facilitates management of changes to base schedules

Automated mirror system resources at ISO intertie scheduling points

- Allows the market to solve for the ISO and another EIM BAA at the same time
- Currently, EIM BAAs are responsible to submit base schedules and update them for mirror system resources
- This enhancement will automate the mirroring of ISO import/export schedule changes at ISO scheduling points after T-40

Base EIM transfer system resource imbalance settlement

- Will provide EIM entities with settlement information for base ETSR schedule changes
  - Determinate point of delivery of base ETSR
  - LMP used for settlement between EIM entities

- The ISO will not require EIM entities use this data but it may facilitate settlement of bilateral transactions

Leveraging non-generator resource (Generic NGR) modeling functionality (1 of 2)

- Utilize the ISO's Generic NGR modeling functionality for EIM participating and non-participating resources
  - Aggregated and non-aggregated
  - Does not observe state of charge limits or constraints
- Generic NGRs can provide positive and negative energy
  - No load only aggregation
- Not subject to demand charges for negative generation

Leveraging non-generator resource (NGR) modeling functionality (2 of 2)

- These resources will be subject to local market power mitigation (LMPM) and can use any of the methods under the ISO's tariff to establish a default energy bid

- Does not support resource adequacy at this time

Allow submission of base generation distribution factors (GDFs) for aggregated non-participating resources

- The market will distribute the base schedule and any imbalances of aggregate EIM non-participating resources using the submitted base GDFs

- Base GDFs will also be used to calculate the aggregate LMP for the aggregate EIM non-participating resource

Consolidated EIM Initiatives

NEXT STEPS

ISO requests written comments by August 17th 2017

- Stakeholders should submit written comments to InitiativeComments@caiso.com

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Post Issue Paper	June 13, 2017
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