Proposed EIM transfer cost and GHG bid adder

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Concepts relevant to account for net energy interchange between BAAs participating in the EIM

- EIM transfer
  - Positive for export and negative for import

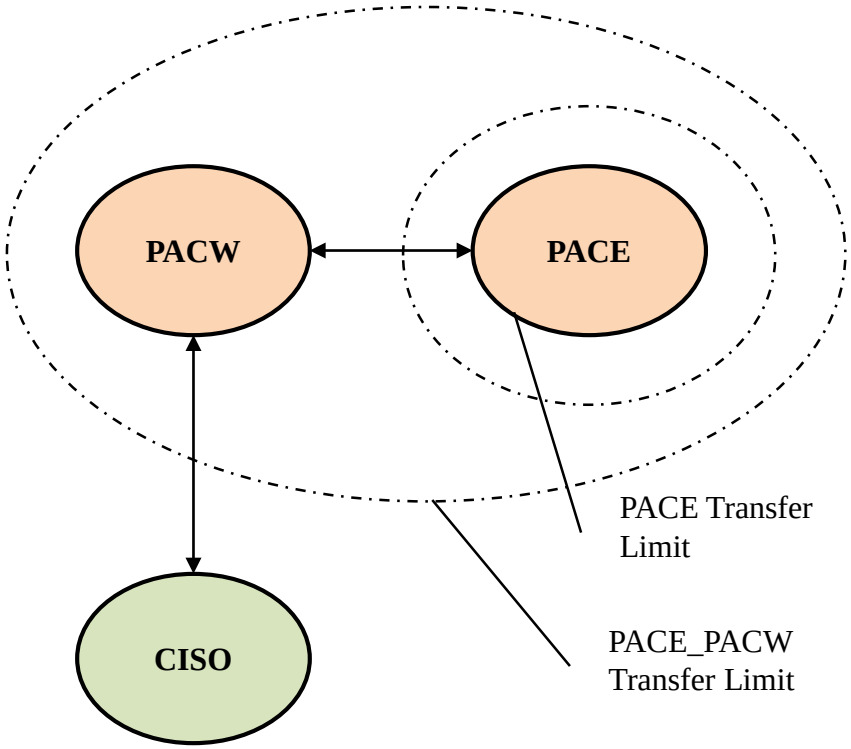
- Energy transfer schedule
  - The assignment of an EIM transfer to an intertie for tagging purposes
  - Separate for import and export, modeled by energy transfer system resources

Energy transfers calculated by the market optimization are used for energy accounting purposes via e-tags

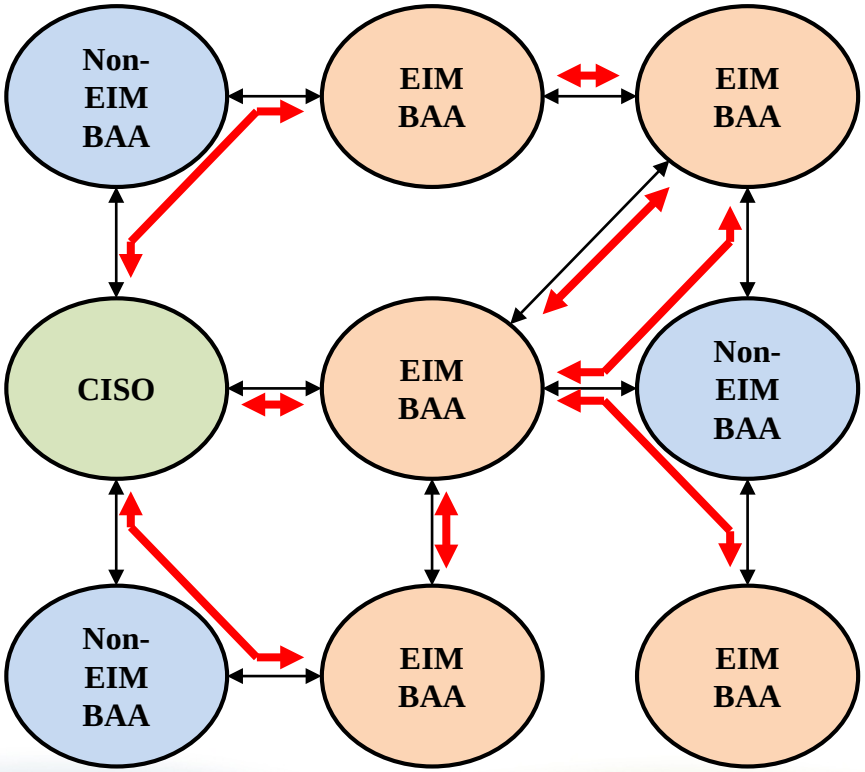
- Intertie schedules must be accounted for via an e-tag to comply with WECC scheduling practices
- E-tags are required for energy transfers between BAAs
- E-tags associated with energy transfers can be static or dynamic, and they are separate for imports and exports
  - Static e-tags are currently used only to account for energy transfers in FMM between PACW and CISO through BPAT

Need to transition from EIM transfer constraints by BAA group to individual energy transfer schedule limits

EIM transfer constraints by BAA group (current)



EIM transfer constraints using energy transfer schedule limits (future)



Achieving an optimal scheduling path enhances efficiency of tagging requirements

- Direct paths, which minimize the number of e-Tags that must be updated, are more optimal than indirect paths
- Paths that allow both FMM and RTD schedule changes, versus paths that only allow FMM or RTD schedule changes, are more optimal
- Paths with less frequent curtailments or outages are more optimal than paths with more-frequent outages

EIM transfer cost

- A small cost parameter that the market software assigned to each energy transfer schedule that the market optimization to select the most optimal paths
- The CAISO, as the market operator, in consultation with the EIM entity would determine the path priority
- More optimal paths will have a lower cost parameter relative to less optimal paths

EIM transfer cost ensures that the market optimization calculates a unique and efficient solution

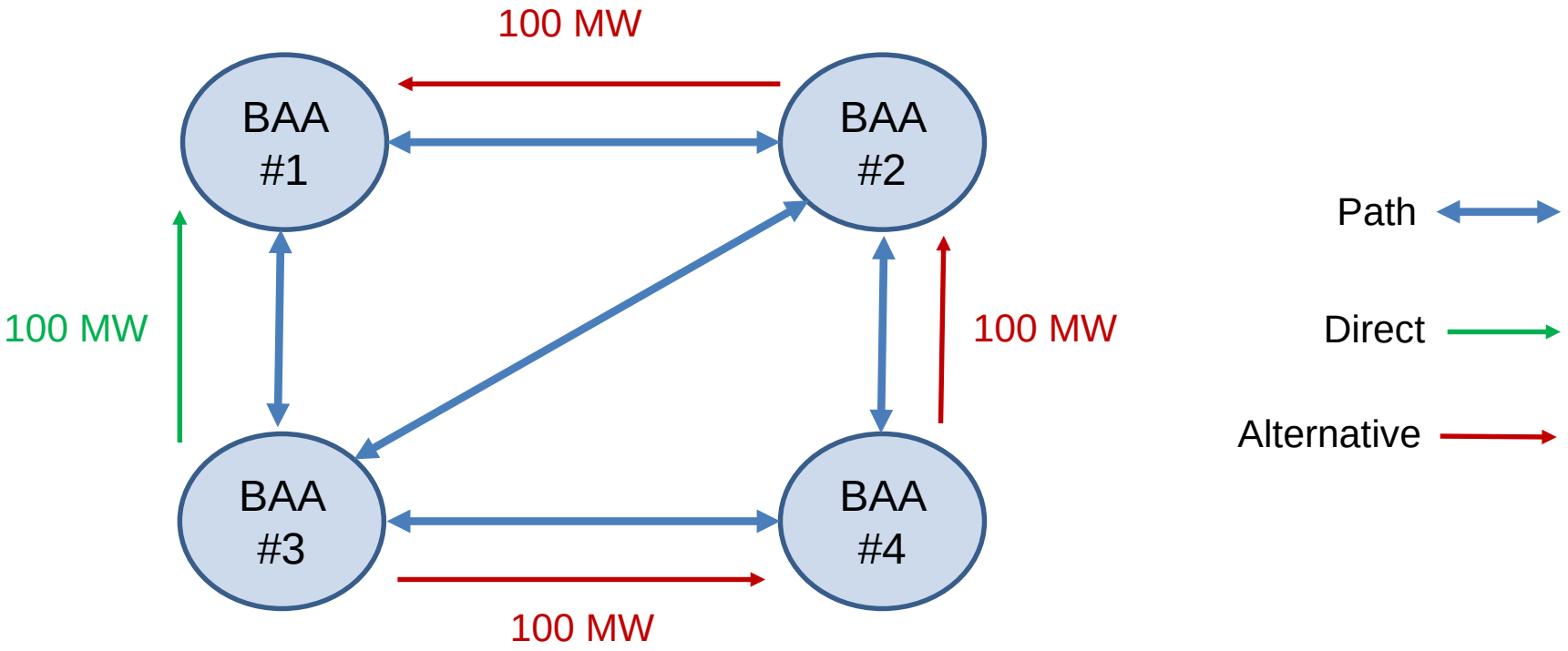
- EIM dispatches resources optimally using bids resulting in real-time energy flows among BAAs in EIM area
- EIM transfers may use available transmission capability or transmission rights made available by an EIM entity
- CAISO does not settle EIM transfers as an explicit import or export for a BAA because the settlement is with the resources within that BAA
- Without EIM transfer costs, the optimization could result in different random transfer patterns across intervals

EIM transfer cost is sufficiently small to not alter the flow-based dispatch or settlement of EIM participating resources

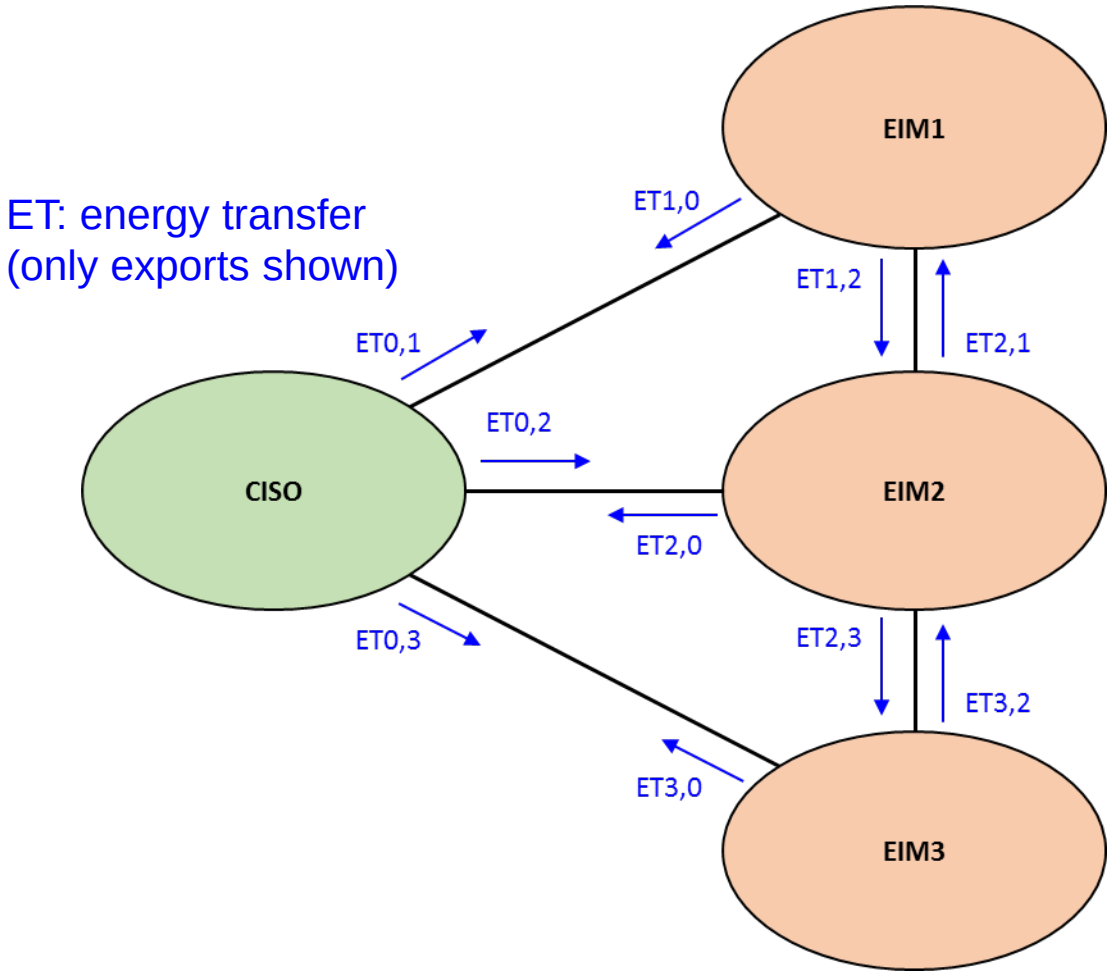
- Distribution of the EIM transfer cost over the available intertie paths should not affect dispatch
- Energy transfer limits are not physical flow limits, but scheduling limits
- Market operator uses net EIM transfers to adjust neutrality cost allocation among the BAAs in the EIM area

EIM transfer cost should not be a material component of the LMP

The EIM transfer cost will select optimal path to schedule EIM transfers



EIM transfer cost will allow the market operator to determine the optimal path for e-tag energy accounting



Adding a small EIM transfer cost on each intertie is sufficient to yield the following unique efficient solution

BAA	Resource	Min	Schedule	Max	Bid
CISO	G0	0	1400	1500	$ 40
	L0		1000		
	T0		400		
	ET0,1	0	0	200	$ -
	IT0,1	0	200	300	$ -
	ET0,2	0	100	100	$ -
	IT0,2	0	0	100	$ -
	ET0,3	0	500	550	$ -
	IT0,3	0	0	500	$ -
EIM1	G1	0	700	700	$ 30
	L1		500		
	T1		200		
	ET1,0	0	200	300	$ -
	IT1,0	0	0	200	$ -
	ET1,2	0	0	0	$ -
	IT1,2	0	0	200	$ -
EIM2	G2	0	1000	1000	$ 20
	L2		600		
	T2		400		
	ET2,0	0	0	100	$ -
	IT2,0	0	100	100	$ -
	ET2,1	0	0	200	$ -
	IT2,1	0	0	0	$ -
	ET2,3	0	500	550	$ -
	IT2,3	0	0	0	$ -
EIM3	G3	0	0	2000	$ 50
	L3		1000		
	T3		-1000		
	ET3,0	0	0	500	$ -
	IT3,0	0	500	550	$ -
	ET3,2	0	0	0	$ -
	IT3,2	0	500	550	$ -

BAA	Resource	Min	Schedule	Max	Bid
CISO	G0	0	1400	1500	$40.0000
	L0		1000		
	T0		400		
	ET0,1	0	0	200	$0.0001
	IT0,1	0	200	300	$0.0001
	ET0,2	0	50	100	$0.0001
	IT0,2	0	0	100	$0.0001
	ET0,3	0	550	550	$0.0001
	IT0,3	0	0	500	$0.0001
EIM1	G1	0	700	700	$30.0000
	L1		500		
	T1		200		
	ET1,0	0	200	300	$0.0001
	IT1,0	0	0	200	$0.0001
	ET1,2	0	0	0	$0.0001
	IT1,2	0	0	200	$0.0001
EIM2	G2	0	1000	1000	$20.0000
	L2		600		
	T2		400		
	ET2,0	0	0	100	$0.0001
	IT2,0	0	50	100	$0.0001
	ET2,1	0	0	200	$0.0001
	IT2,1	0	0	0	$0.0001
	ET2,3	0	450	550	$0.0001
	IT2,3	0	0	0	$0.0001
EIM3	G3	0	0	2000	$50.0000
	L3		1000		
	T3		-1000		
	ET3,0	0	0	500	$0.0001
	IT3,0	0	550	550	$0.0001
	ET3,2	0	0	0	$0.0001
	IT3,2	0	450	550	$0.0001

CAISO proposes to apply EIM transfer cost in both 15-min and 5-min optimizations to determine optimal transfer pattern

- Direct paths minimize the number of e-tags to be updated and are more optimal than indirect/circular paths
- Paths that allow both 15-min and 5-min schedule changes are more optimal than those that don't
- Paths with less frequent curtailments or outages are more optimal than paths with more frequent outages
- More optimal paths will have a lower cost parameter
  - The EIM transfer cost will be set to the lowest value that allows the market optimization to differentiate among path priorities

Priorities may require adjustment based on new EIM entities, seasonally, or as topology and BAA boundaries change

- CAISO proposed the maximum EIM transfer cost of $0.10 per MWh based on initial functional testing

- CAISO will apply the lowest cost between zero and $0.10 per MWh that allows the market optimization to observe the relative priority of each path
  - The parameter cost and the path priorities will be set forth in the CAISO's business practice manuals

- CAISO has validated transfer schedules between PacifiCorp and NV Energy in structured scenarios
  - The CAISO will apply different EIM transfer costs for the two available paths to observe the optimal schedules

EIM transfer cost can have a negligible impact on location marginal prices

BAA	LMP
CISO	$40.00
EIM1	$40.00
EIM2	$40.00
EIM3	$40.00

BAA	LMP
CISO	$40.00
EIM1	$39.99
EIM2	$40.01
EIM3	$40.02

- EIM transfer cost on constrained transfer does not have an impact on LMPs
- EIM transfer cost on marginal transfer to a BAA with a marginal resource does not have an impact on the LMPs in that BAA
- EIM transfer cost on marginal transfer to a BAA without a marginal resource has an impact on the LMPs in that BAA:
  - EIM transfer cost on marginal export transfer is subtracted from LMPs in the BAA; and
  - EIM transfer cost on marginal import transfer adds to LMPs in the BAA

Further questions on the EIM transfer cost proposal?

GHG design treats EIM participating resources serving CAISO load similarly to resources within CAISO

- GHG regulations apply to first deliverers of electricity
- Resources located in the CAISO have a compliance obligation regardless of the delivery location
- EIM participating resources incur a GHG compliance obligation if dispatched to serve CAISO load
- EIM participating resources submit two bid components: (1) energy and (2) GHG compliance costs
- CAISO minimizes total bid costs to serve load both within CAISO and load outside of CAISO

CAISO proposes to allow EIM participating resources to bid up to their maximum daily cost

- GHG bid adder covers costs of compliance plus any financial risk between the actual cost and the daily cost
  - Cost curve of the default energy bid dispatch should cover the annual emission responsibility for CAISO resources
  - EIM participating resource may be dispatched to serve imbalances outside of California without cost recovery
  - No guarantee that the resources' annual emissions will be the same as the energy deemed delivered to the CAISO
- Facilitates EIM participating resources making capacity available for dispatch to the CAISO
  - Without ensuring costs can be recovered, the resource could bid zero MW to support EIM transfers to CAISO

An example illustrates how the GHG proposal seeks to treat similarly situated resources similarly

	MW Quantity Offered	$1000 Bid Cap Applied	MPM Applied	DEB GHG Treatment	Limits on GHG Bidding
ISO Internal Resource	Hourly	Energy Bid	Energy Bid	Daily cost curve with 10% adder	N/A
ISO Import	Hourly	Energy Bid	N/A	N/A	N/A
EIM Participating Resource	Hourly	Energy Bid + GHG Bid	Energy Bid	N/A	Daily maximum cost with 10% adder

Further questions on GHG bid adder proposal?