



California ISO

# Congestion cost analysis from historical WEIM performance

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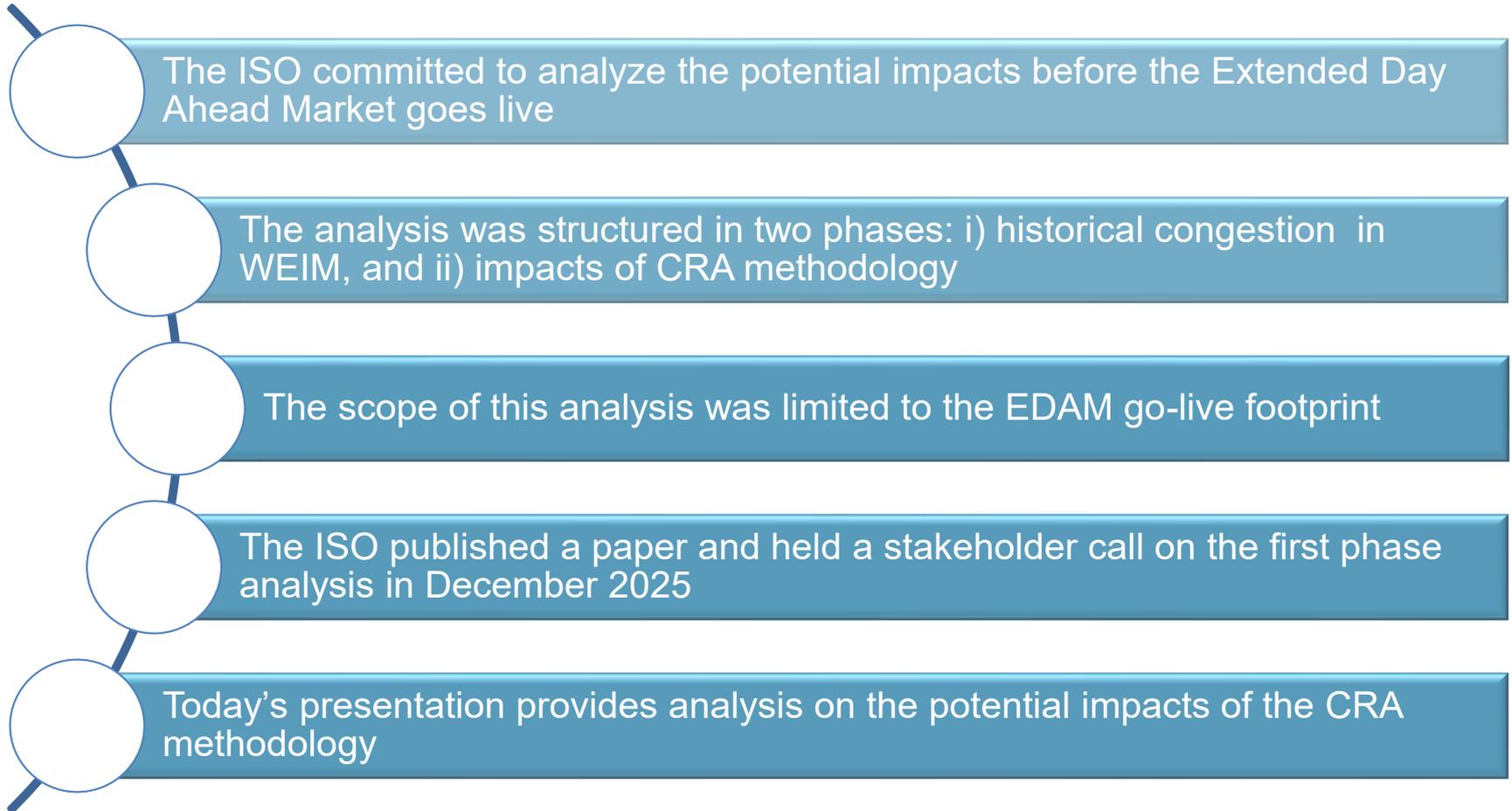
Director, Market Performance & Advanced Analytics

Market Surveillance Committee Meeting

General Session

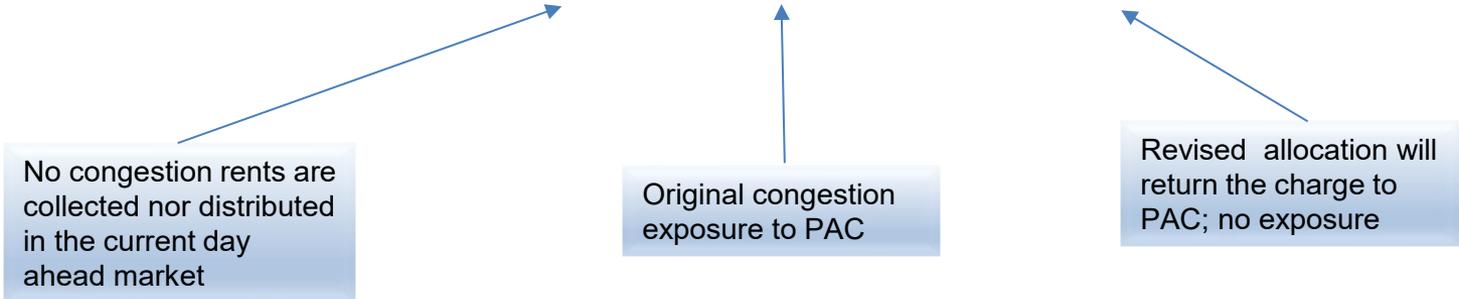
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## The Market Surveillance Committee expressed the need for additional analysis of the revised methodology prior and post EDAM go-live



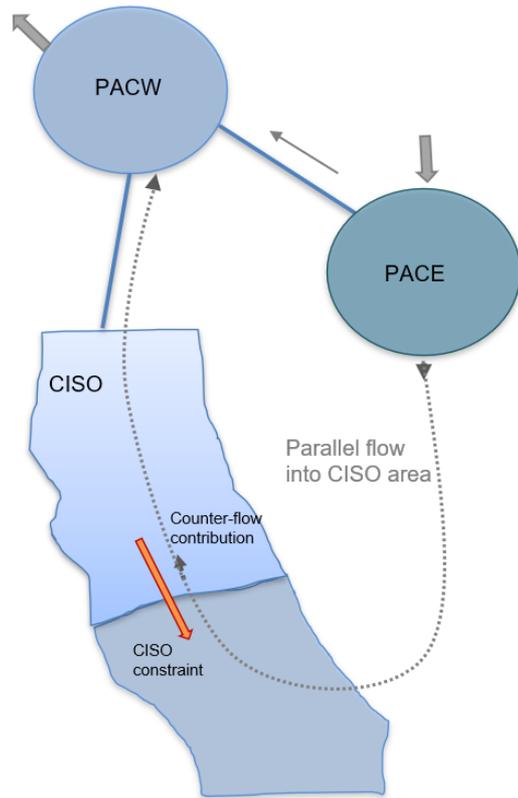
The revised methodology for congestion revenue allocation could represent an incentive of \$1.6 and \$2.5 million per month if PacifiCorp exercises rights for PACE-PACW transfers and self schedule internal generation

2-Year Congestion Rents in Millions			
	Current DA	Original CRA	Revised CRA
Transfer PACE-PACW	\$0	\$59.17	\$0.00
Self-Schedule Generation	\$0	\$39.06	\$0.00



Relative to historical congestion rent volumes, this level of rents is low and may not warrant concern  
 Outcome of revised CRA no worse than current DA solution for CAISO congestion rents, improved outcome for PAC

# Transactions in PacifiCorp areas can exacerbate or relieve congestion on California ISO area transmission constraints\*

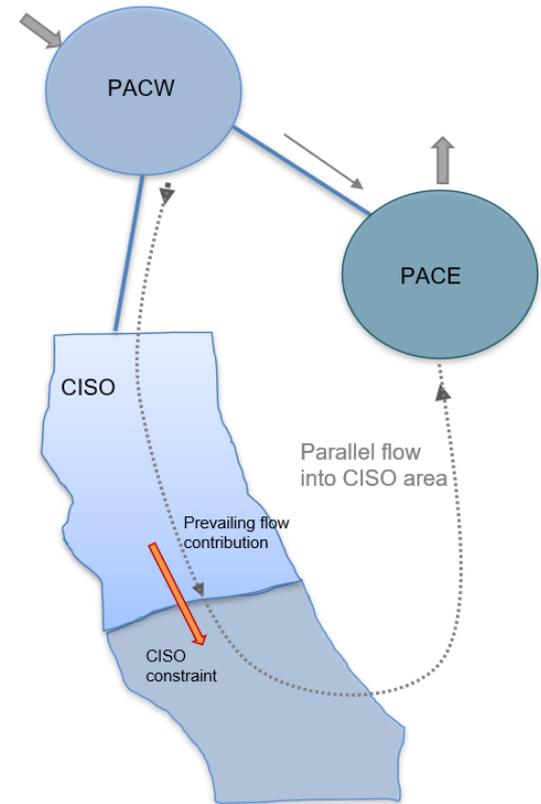


Transactions with counter-flows reduce congestion rents

Transactions in one area can create parallel flows in another area

Prevailing flows are charged for contributing to congestion

Counter-flows get paid for relieving congestion



Transactions with prevailing flows contribute to congestion rents

\* Conversely, transactions in CAISO area can exacerbate or relieve congestion in PAC area constraints  
 This analysis focuses on congestion from transmission constraints; it does not include congestion from transfers

# Flow contributions from transactions on transmission constraints reveal structural patterns of congestion

A transaction is defined between a source and a sink

Shift factors for each location are available from the WEIM market solution

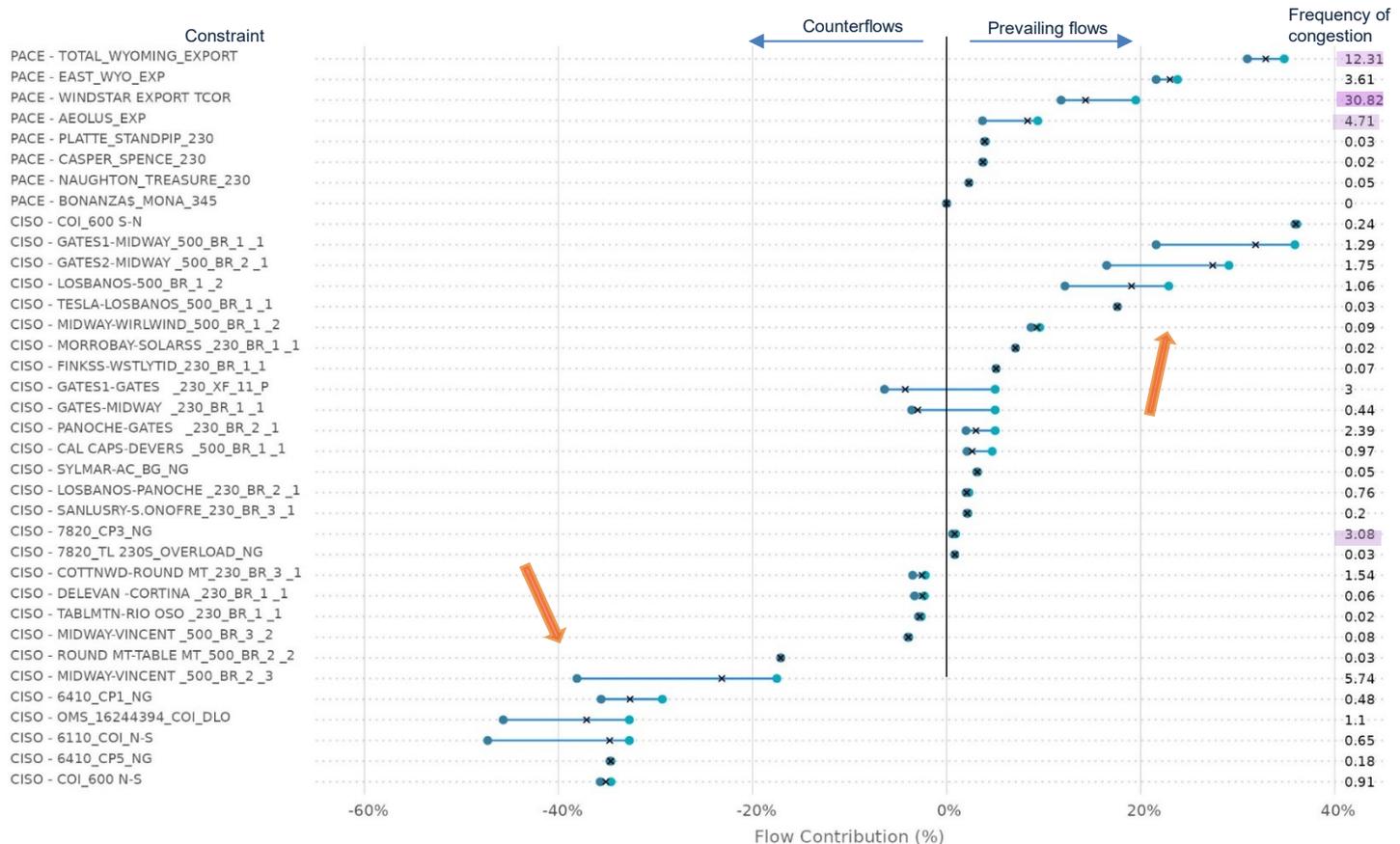
The shift factor difference between source and sink measures the flow contribution of a transaction

	PAC transaction	CISO transaction
PAC constraint	Internal flow	Parallel flow on PAC area
CISO constraint	Parallel flow on CISO area	Internal flow

WEIM shift factors are a proxy for EDAM shift factors

For this analysis, aggregated load points (ELAPs) are used for sinks, while DGAPs or individual generation locations are used as sources

# Transactions from PACE area to PACW area will have high-flow contributions on a few constraints in the CAISO area



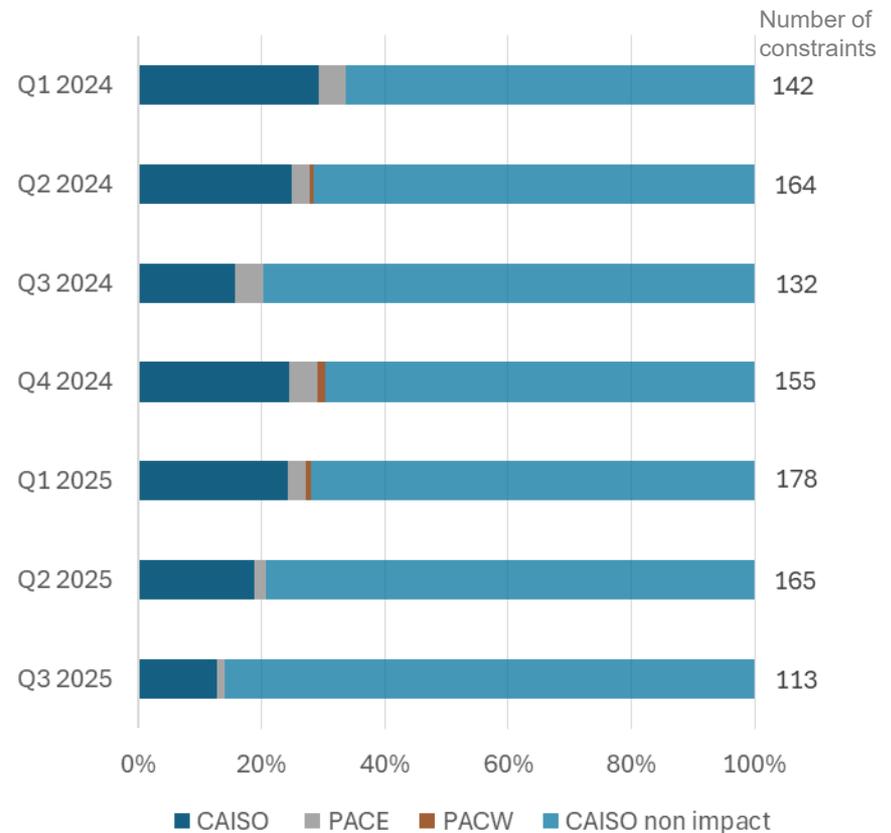
About 21 percent of all constraints located in the CAISO area are affected by parallel flows generated by transactions between PacifiCorp east and west areas

# In WEIM today, transactions in PAC impact congestion in CAISO to a much greater extent than transactions in CAISO impact congestion in PAC

From the set of all impacted constraints by PAC or CAISO transactions, on average:

- 21.5 percent are on CAISO area
- 3.2 percent are in PACE area
- 0.4 percent are in PACW area
- 75 percent are in CAISO area but are not impacted by PAC transactions

Share in percent of constraints with an impact by area



The dollar impact analysis is a reference of historical WEIM congestion, and it is not a projection of EDAM costs

$$Impact = \alpha * \beta * \gamma * \delta * \varepsilon$$

where

*Impact* : congestion rents

$\alpha$  : what constraints are congested

$\beta$  : how frequently they are congested (hours of congestion)

$\gamma$  : the severity of congestion (shadow price of constraints)

$\delta$  : contribution to congestion (sensitivity factors)

$\varepsilon$  : volume of transaction (MW rights or schedules)

How can we estimate potential impacts?

$\alpha, \beta, \gamma, \varepsilon$ : they are largely set by bidding behaviors and market economics. What assumptions can we make about them?

$\delta$  : it is based on the inherent transmission configuration with minimum influence from market conditions

We have historical values from WEIM. Are these a good proxy to project EDAM participation and congestion conditions?

# Assumptions and their implications

- Historical congestion in WEIM is used as a proxy to estimate the potential impact of EDAM parallel flows on congestion rents
- The assessment uses
  - Fifteen-minute historical prices for transmission constraints (shadow prices)
  - Shift factors from the fifteen-minute solution, representing the transmission configuration in the real-time market
- Congestion management in WEIM achieves optimal solutions by optimizing resource schedules in the WEIM footprint, which is a wider footprint than the EDAM's footprint
- In the current ISO markets, congestion observed in real-time is generally higher than the congestion observed in the day-ahead market
  - Less flexibility to redispatch resources in real-time
- Assessment based on real-time congestion need to be considered with caveats as it may not reflect precisely EDAM congestion

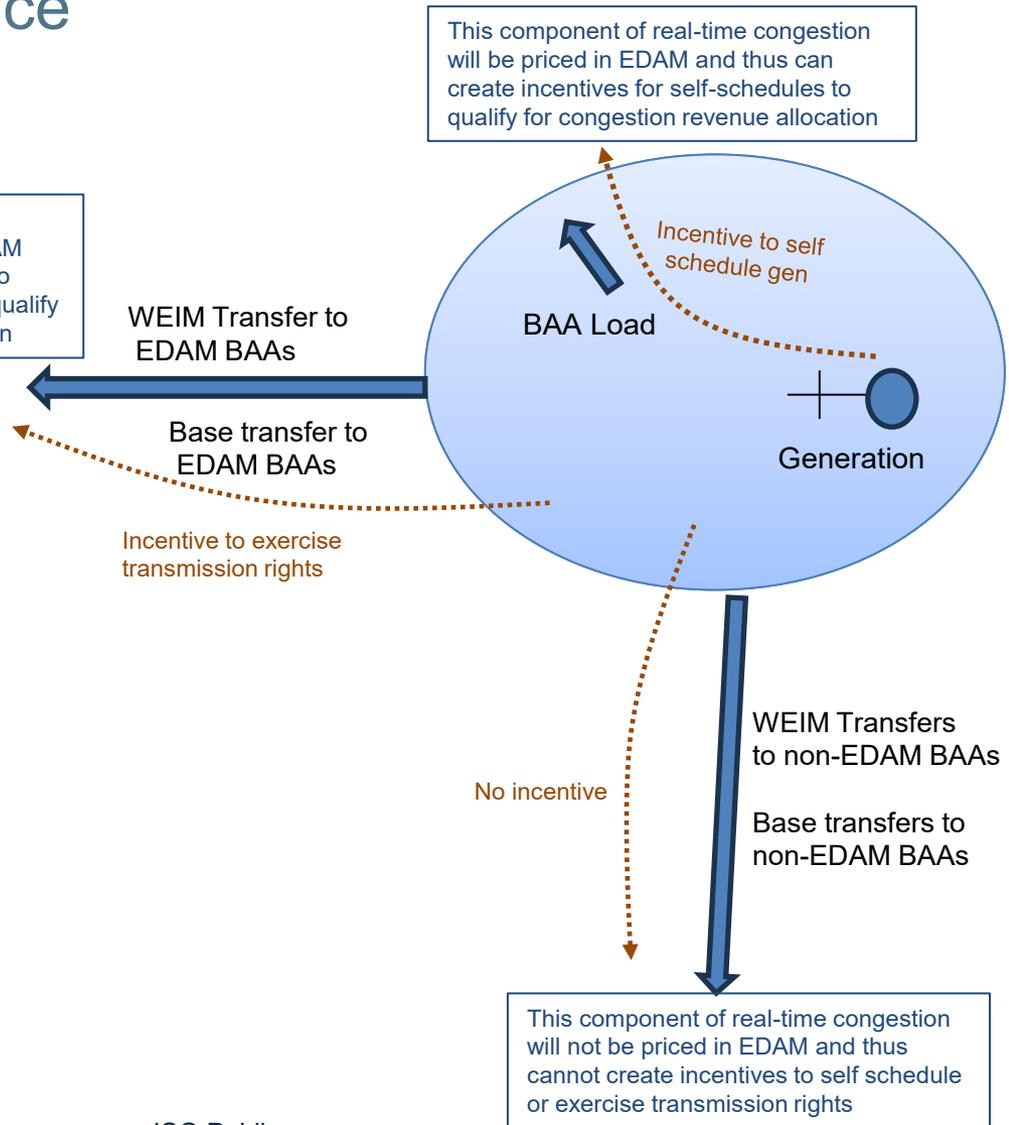
# Not all the elements of the WEIM solution can be used as a proxy for EDAM reference

Using base generation can be a proxy for EDAM self schedules (capped up to the area demand) subject to incentives

Base schedule=Support BAA demand

Using FMM cleared schedules\* will distort the volumes subject to incentives

FMM schedule= support BAA demand + transfers to EDAM BAAs + transfers to non-EDAM BAAs



# This impact assessment considers three different elements of the historical congestion in WEIM

## 1. Historical base transfers from PACE to PACW used in WEIM

### Incentives to exercise transmission rights PACE-to-PACW

base transfers PACE to PACW serve as a proxy to exercise for transmission rights in EDAM

## 2. Historical optimized WEIM transfers from PACE to PACW

### Incentives to exercise transmission rights PACE-to-PACW

Optimized WEIM transfers PACE to PACW serve as a proxy for exercise of transmission rights in EDAM

## 3. Historical base generation used to balance each PAC area's demand

### Incentives to self schedule generation

base generation in PACE and PACW area serves as a proxy for self schedules in EDAM

## Impact # 1 and # 2: estimate congestion rents based on the potential transfer capability that may be used in EDAM

- These PACE-to-PACW transfers will create parallel flows on CAISO constraints, creating the scenario where the CRA methodology is relevant
- Consider the base transfers historically used in the real time market between PACE and PACW as a proxy
- Consider also the historical WEIM optimized transfers
- For sensitivity analysis, also consider transfer capability scenarios
  - Transfer capability sensitivities include:
    - (300MW, 600MW, 900 MW and 1200 MW)

The congestion rents related to historical base transfers between PACE and PACW amounts to \$2.34 million per month

Xfer (MW)	Monthly Congestion rents	
	Prevailing (Millions \$)	Counterflow (Millions \$)
WEIM Xfer	0.13	-0.04
Base Schedules	2.34	-0.13
300	1.74	-0.24
600	3.48	-0.48
900	5.22	-0.72
1200	6.96	-0.96

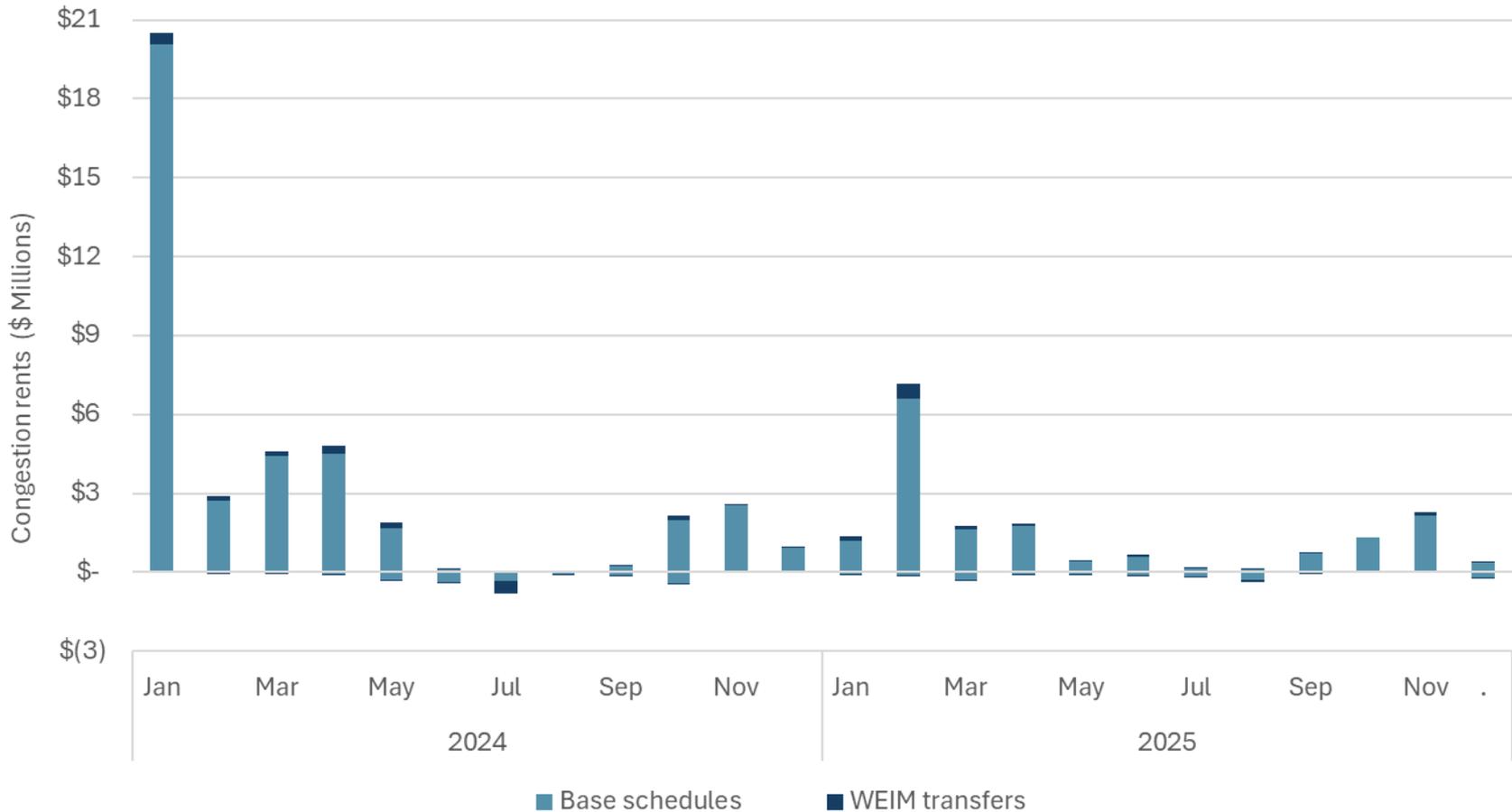
Using the historical base schedules as a proxy for the level of transfers that can occur in EDAM offers a proxy for congestion rents

Different sensitivity scenarios offer a glance of how much higher congestion rents would be if more transfers associated with transmission right are exercised

The congestion rent estimate increases proportionally to the level of transfers assumed, and it can be as high as \$6.96 million per month

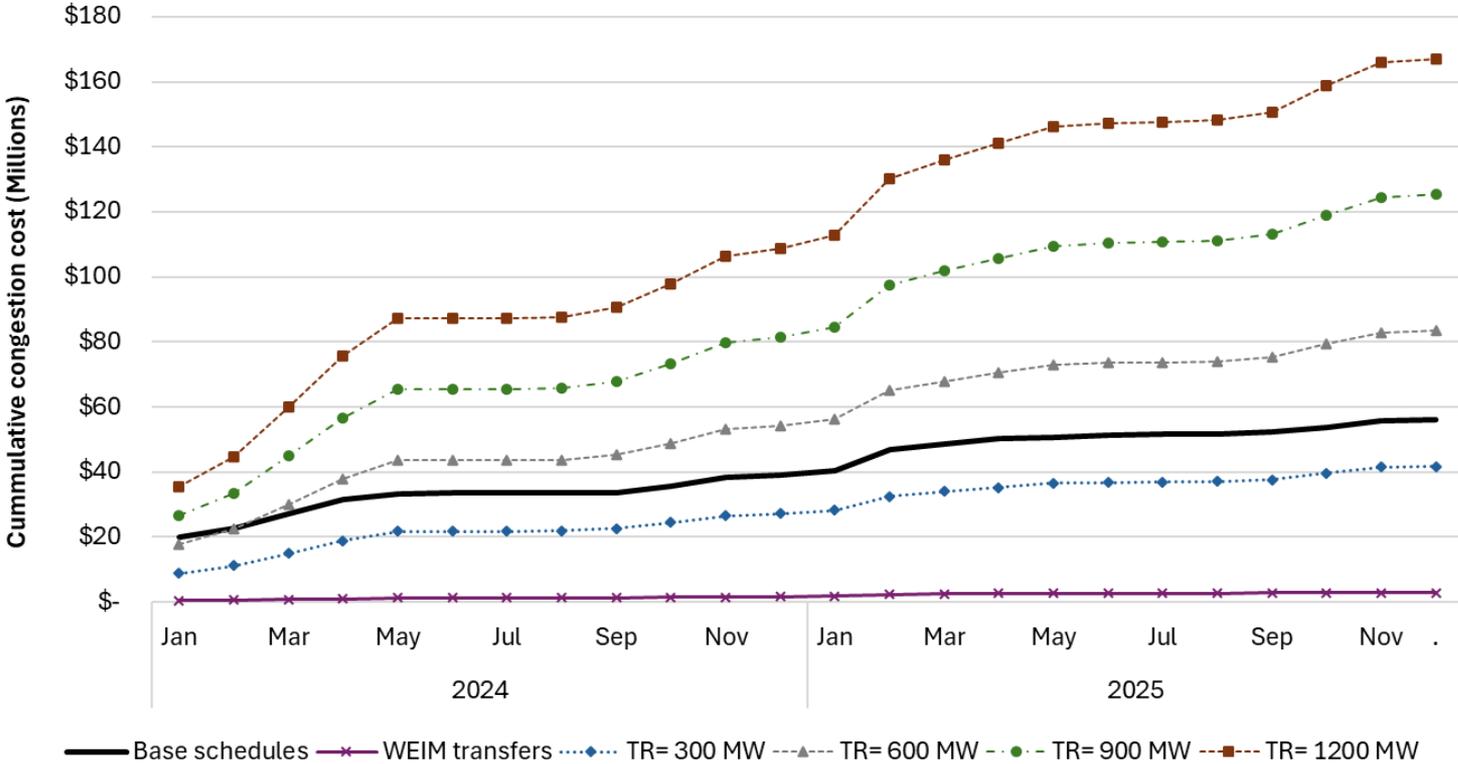
Most of the congestion rents accrued in non-summer months

# The congestion rents related to historical base transfers between PACE and PACW amounts to \$2.34 million per month



# Assuming use of rights up to 1200 MW from PACE to PACW all the time can result in congestion rents up to about \$6.9 million

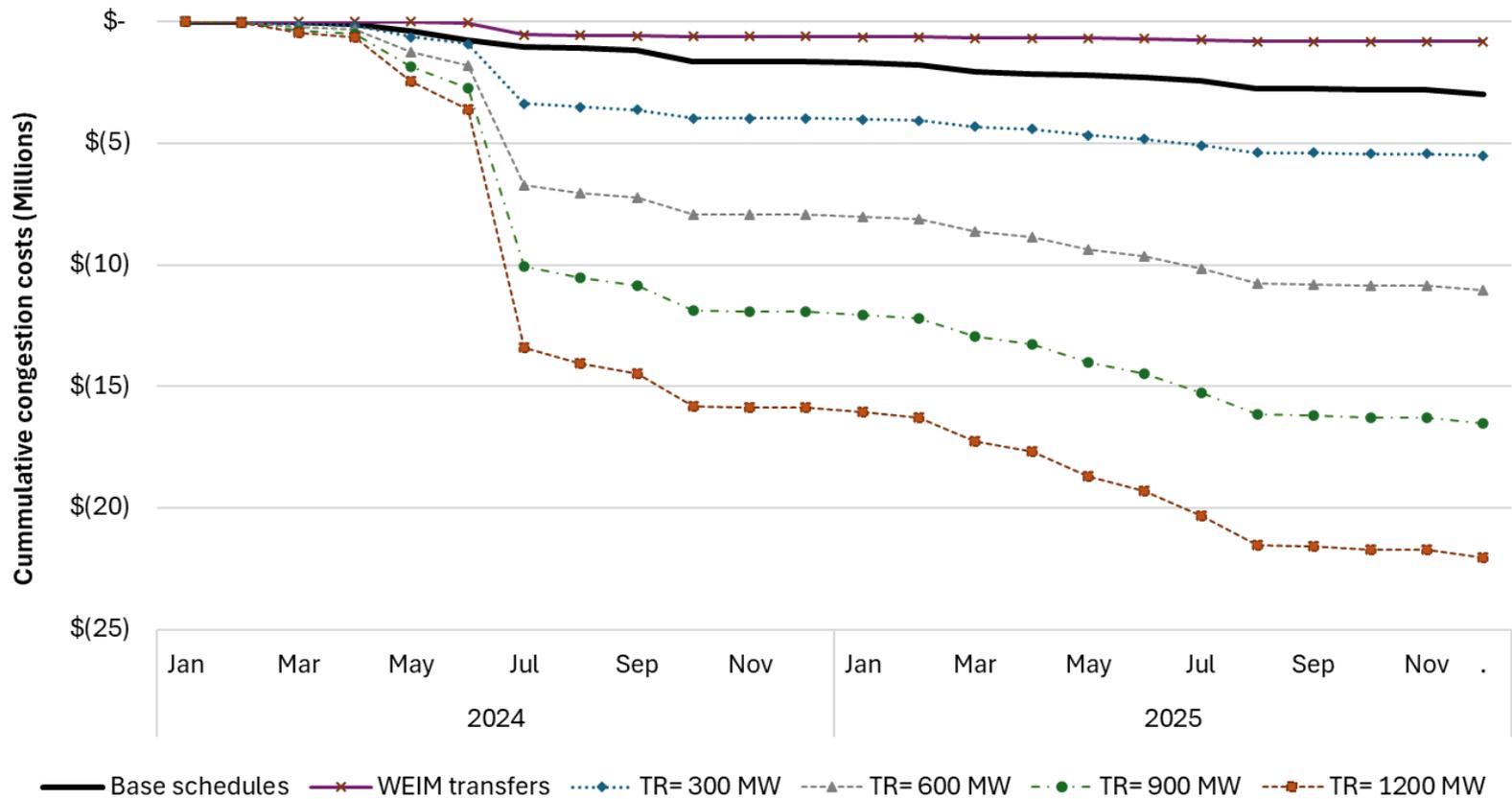
Cumulative of monthly costs from prevailing flows in 2024-2025



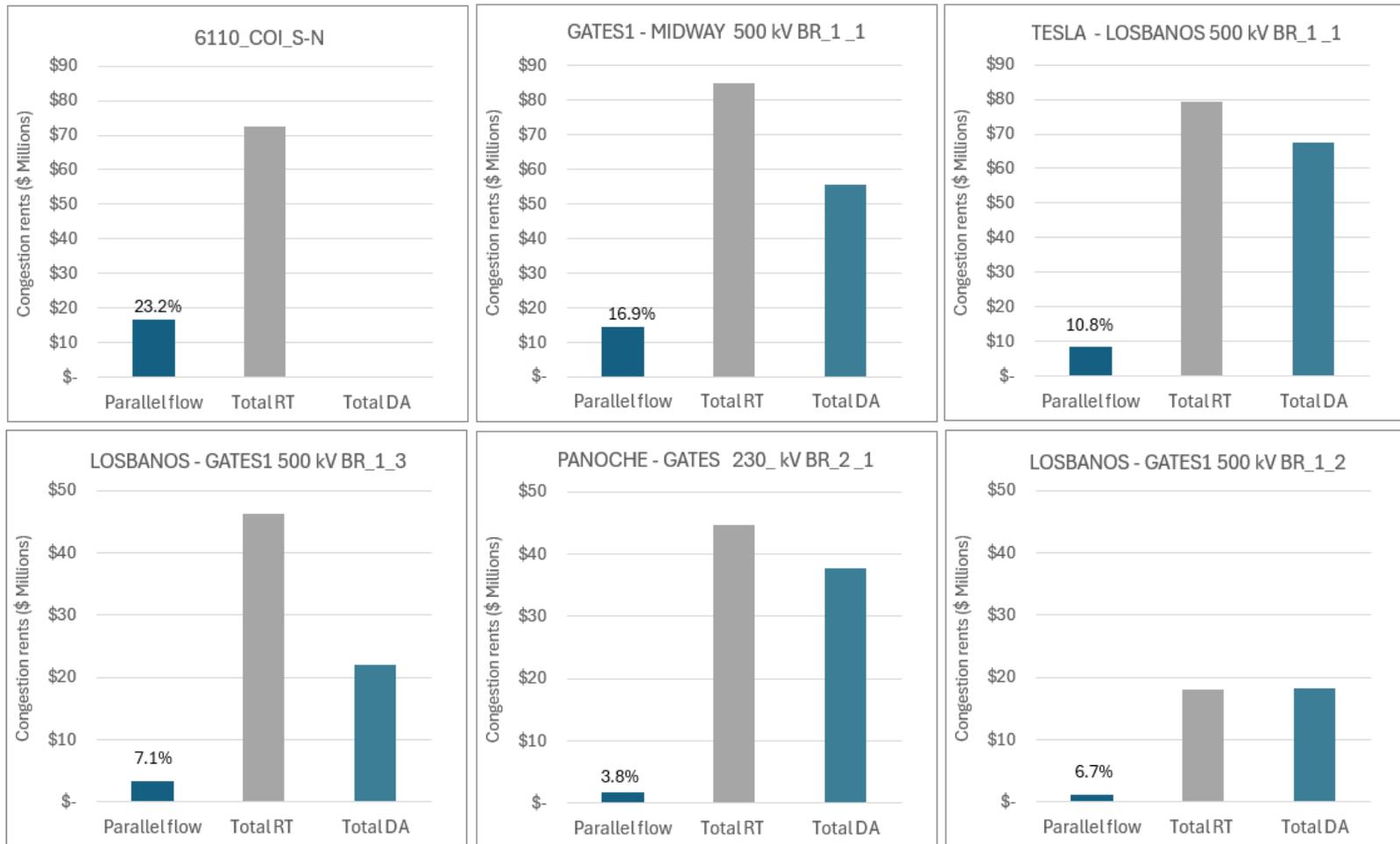
The congestion rents using historical base schedules fall within the range of 300-600MW of transfers

# Assuming use of rights up to 1200 MW from PACE to PACW all the time can result in counter-flows payments of \$1 million per month

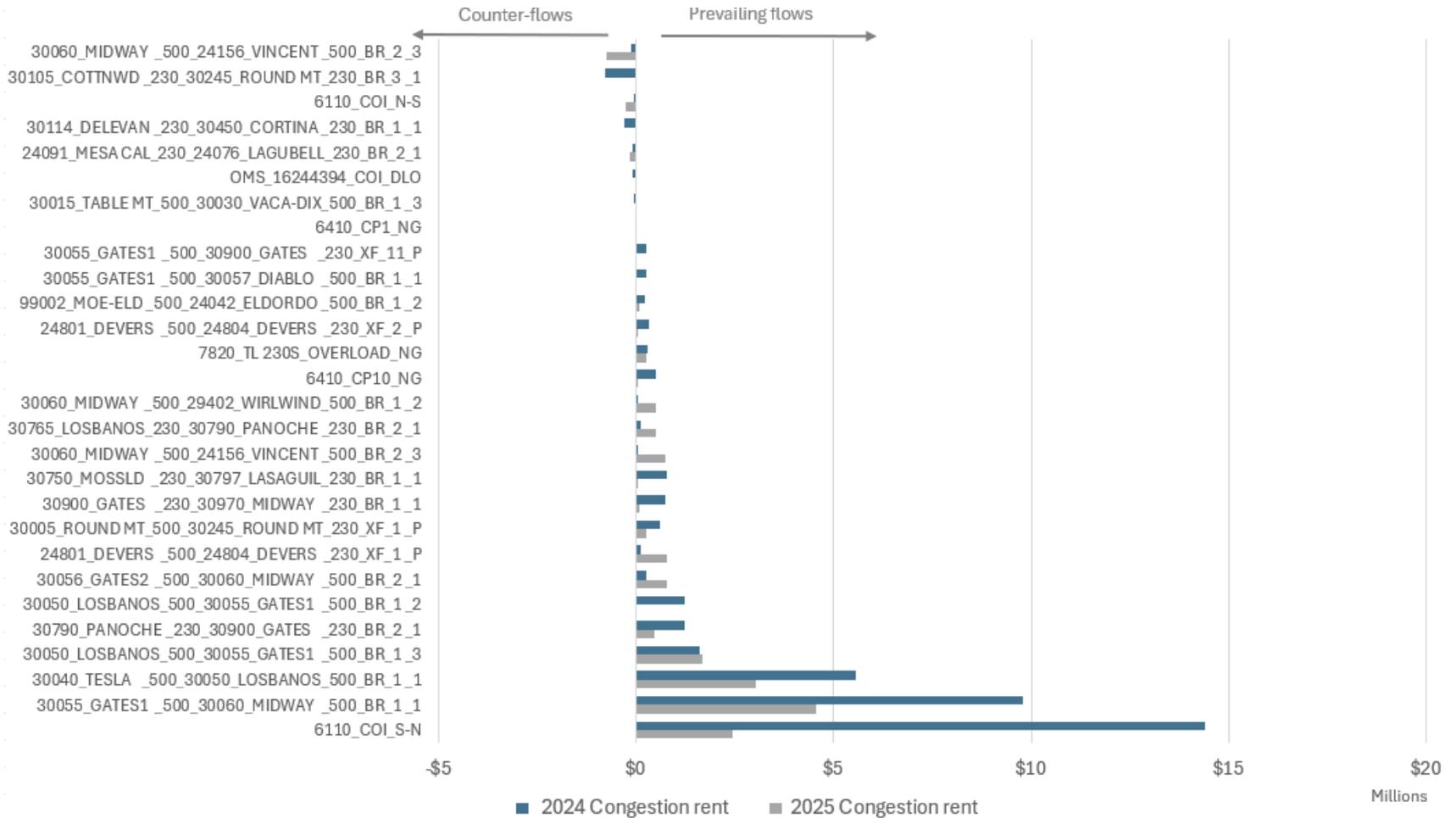
Cumulative of monthly costs from counterflows in 2024-2025



# Congestion rents from prevailing flows represent a moderate percent of total rents for the top constraints



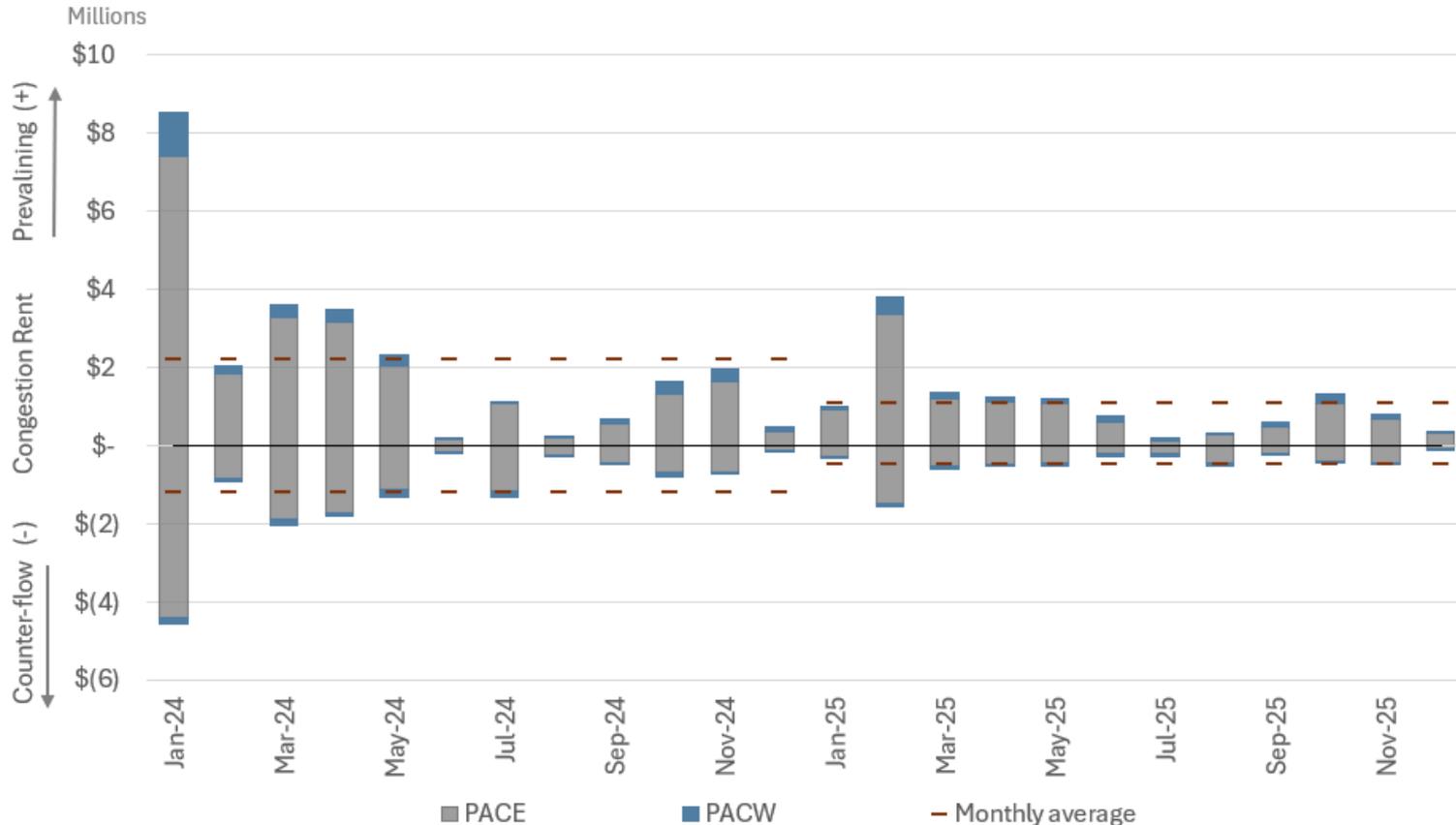
# Most congestion rents accrue on a handful of constraints



## Impact #3 : estimate congestion rents based on the potential self scheduling of internal generation in PAC areas

- Use the base schedules of internal generation as a proxy of what the EDAM self schedules associated with exercise of eligible transmission rights for internal generation could be
- Use the WEIM historical congestion to estimate the congestion rents collected on all internal generation
- Each base schedule of generation is modelled as a source to sink transaction within each PAC area
- Base transfers between each PAC area to any other WEIM or non-EIM area are not considered in this estimation because they will not be priced nor optimized in EDAM, and will not collect rents
- Since base schedules of internal generation can be more than the area demand, the estimates are capped to the amount of demand of the PAC area (OATTs limits exercise of NITS up to their demand level)

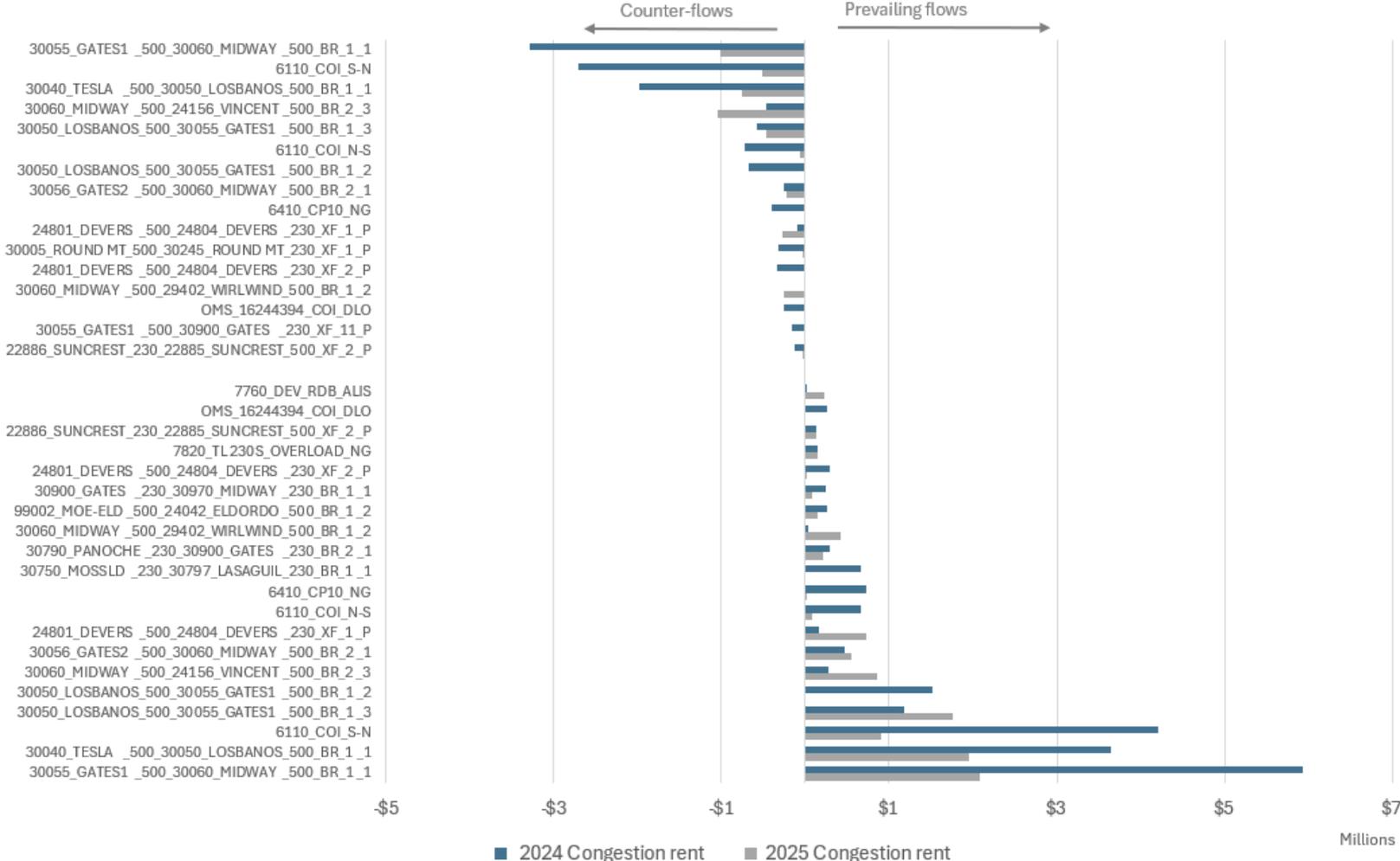
The total PAC average estimated congestion rents for prevailing flows is \$2.2 and \$1.1 million per month in 2024 and 2025, respectively



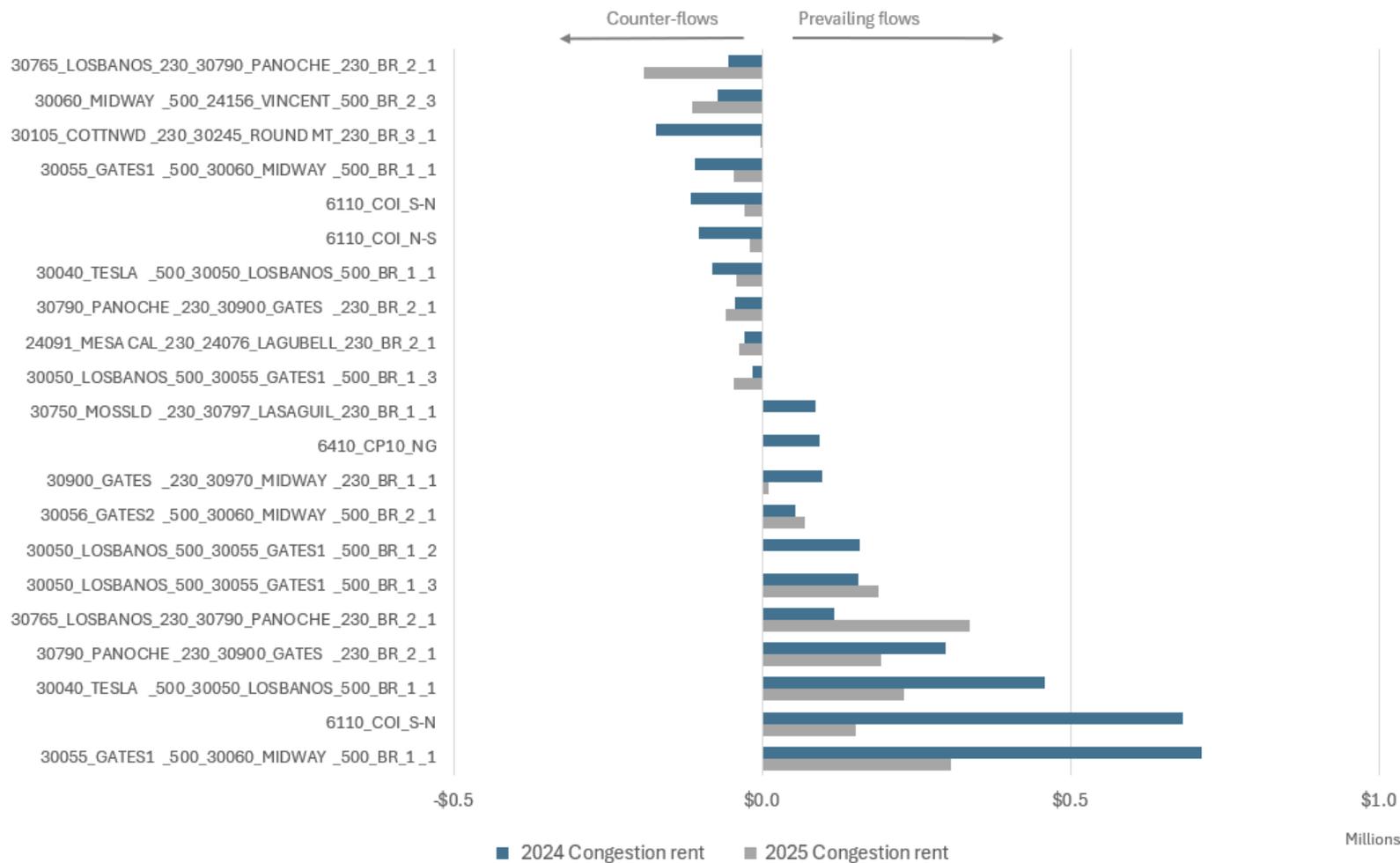
About 90 percent and 87 percent of all congestion rents for counterflow and prevailing flows, respectively, were collected in PACE area

January 2024 estimated congestion rents are atypically higher due to significant congestion from an extreme cold weather impacting the Pacific Northwest

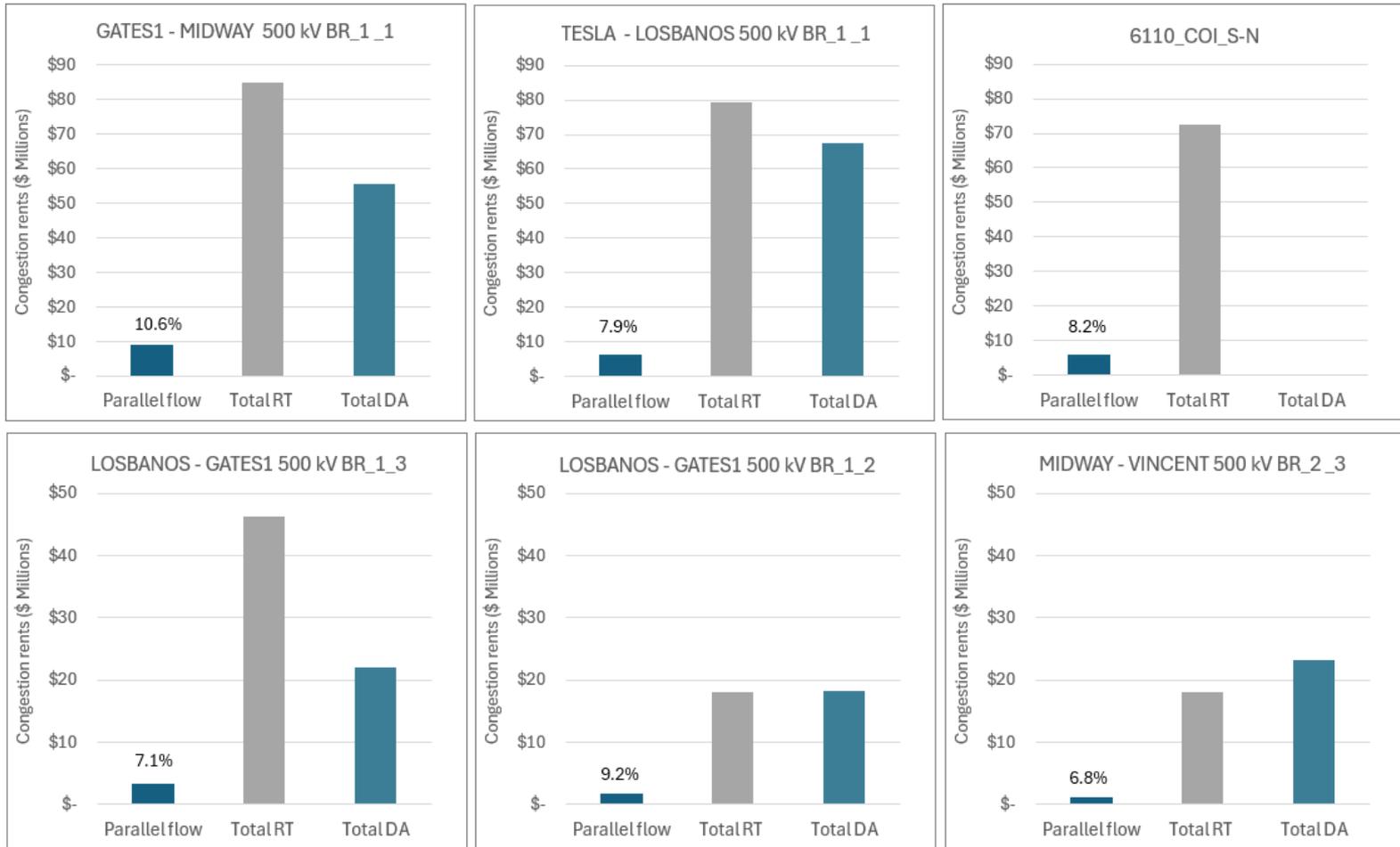
Although over 100 constraints are affected by prevailing parallel flows, congestion rents are highly concentrated, with 92 percent accruing in the top 20 constraints. PACE area



Although over 100 constraints were affected by prevailing parallel flows, congestion rents were highly concentrated, with 95 percent accruing to just the top 20 constraints. PACW area



# Congestion rents from prevailing flows represent less than 11 percent of total rents of the top constraints



In addition to the reference of total congestion rents from real-time congestion, the total congestion rents accrued on these constraints in the day-ahead market can illustrate a baseline