Brattle EDAM Simulations: PacifiCorp Results

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Purpose and Scope of Study

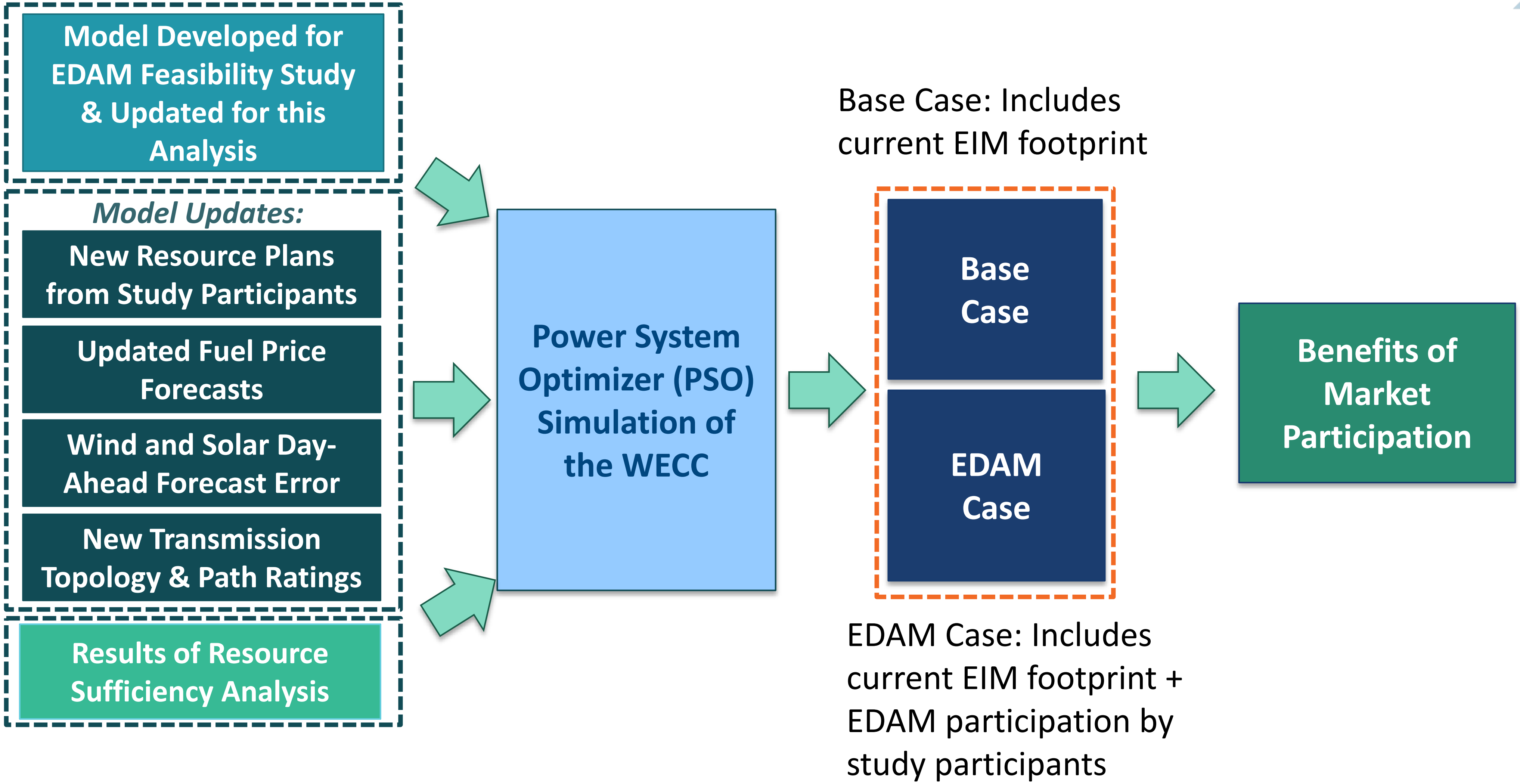
The purpose of the study was to simulate the specific EDAM design, not simplified representations of wholesale market alternatives in the WECC

Therefore, the simulations include:

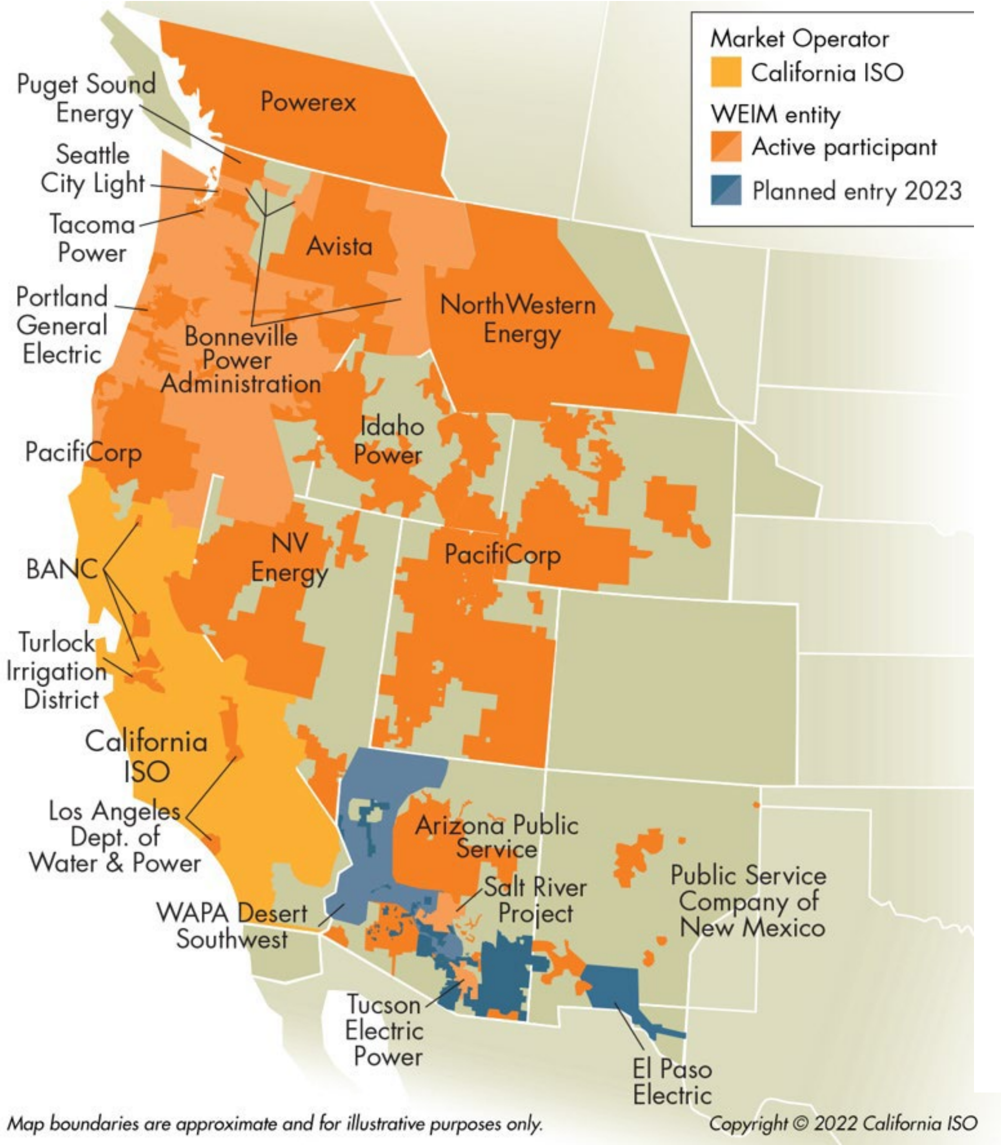
- Benefit estimates include (1) Adjusted Production Costs (APC), (2) impacts on wheeling revenues and bilateral trading gains, and (3) tie-line-specific EDAM congestion and transfer revenues
- The proposed GHG structure for the EDAM, including the "GHG Reference Pass"
- Implications in both the day-ahead and real-time market timeframes
- Production costs for individual EDAM study participants, including wholesale sales and purchases in the EDAM, EIM, and bilaterally at the major trading hubs in the WECC
- The continued existence of the EIM market functioning in parallel with the EDAM
  - Including impacts on the existing EIM congestion revenues and GHG structure

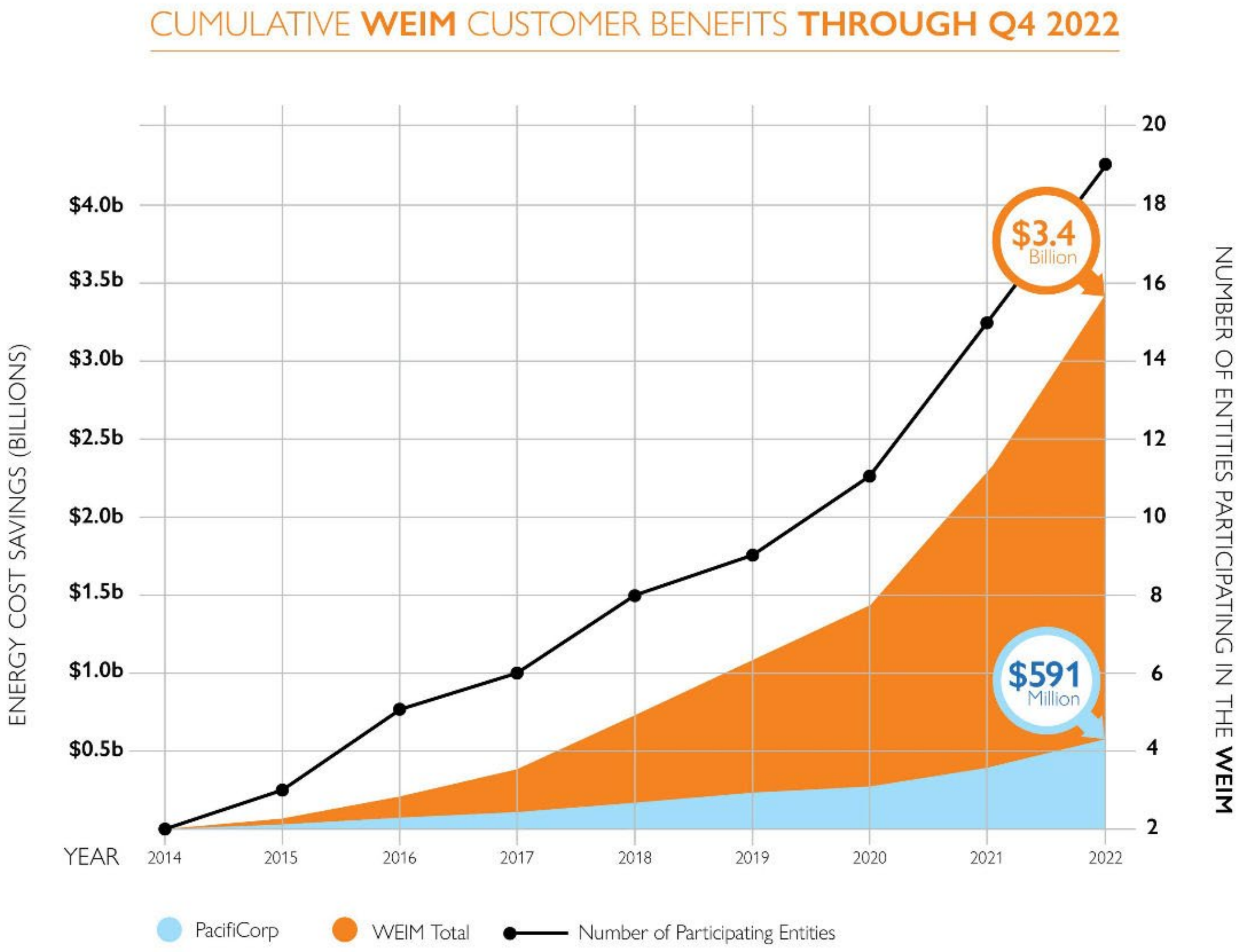
This EDAM study differs from other regional market studies in the WECC, which focus mostly on APC benefits and rely on simplified proxies of EIM/EDAM/RTO markets that do not reflect the specific characteristics and impacts associated with the EDAM design

Study Framework and Benefits Calculation



Study Estimates EDAM Benefits Incrementally to EIM Benefits





Executive Summary of EDAM Study Results

The results document significant benefits offered by the proposed EDAM design:

- **Over $800 million in annual cost savings to EDAM participants, with net benefits of over $430 million**
  - Savings associated with 50 TWh in EDAM transactions, representing a 27% increase in trade between EDAM participants
  - PacifiCorp and every one of the other assumed EDAM participants benefits (even after considering reduced bilateral trading gains and wheeling revenue losses, if any)
  - Results are net of reduced EIM benefits (i.e, based on difference of "EDAM+EIM" benefits and "EIM" base-case benefits), reflecting that EDAM more efficiently takes on a portion of the role played by EIM today
- **2.4 TWh in reduced renewable generation curtailments and reduced overall emissions**
  - The EDAM design's reference pass methodology successfully prevents any significant resource reshuffling, resulting in EDAM-, EIM-, and WECC-wide decreases of GHG emissions, with lower renewable generation curtailments, reduced fossil fuel generation, and a displacement of less efficient generation with increased output from lower-cost resources

Model Overview

Overview of Modeling Approach

We utilize the WECC ADS nodal production cost model as a starting point imported into Power System Optimizer (PSO), as refined during the EDAM feasibility study and follow-on engagements

Utilized the Polaris Power System Optimizer (PSO), an advanced market simulation model

- Nodal mixed-integer model representing each load and generator bus in the WECC
- Licensed through Enelytix
- Detailed operating reserve and ancillary service product definition
- Detailed representation of the transmission system (both physical power flows and contract paths)
- Sub-hourly granularity (but used hourly simulations due to limited data availability)
- Designed for multiple commitment and dispatch cycles (e.g., DA and RT) with different levels of foresight
- EDAM feasibility study assumptions updated to reflect the most recent utility resource plans and forecasts of system conditions and costs

ENELYTIX® powered by PSO

PSO is uniquely suited to simulate bilateral trading, joint dispatch, imbalance markets, and RTOs, reflecting multiple stages of system operator decision making

Multi-Functional Simulation of WECC

Markets/RTO Functions & Configurations

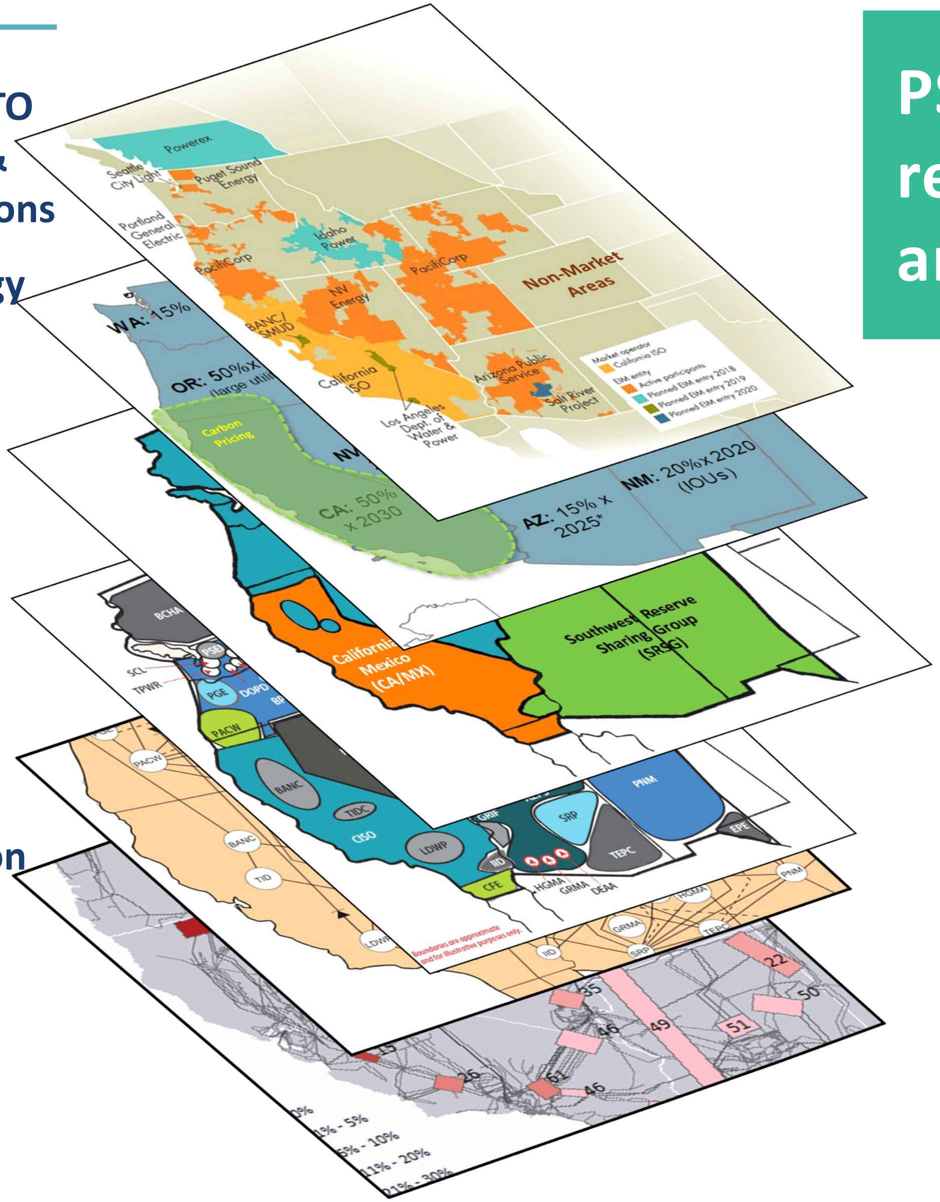
Clean Energy Policies

Reserve Sharing

BAA Functions

Bilateral Contract Paths and Transmission Rights

Physical Flows and Constraints



PSO employs multi-layer simulations to represent the various physical, policy, and operational facets of the WECC

- Physical grid with ~20k buses, ~25k lines and ~5k generators represented as DC power flow
- 38 Balancing Authority Areas (BAAs) and contract paths
- The WECC reserve sharing groups
- Diverse state clean energy policies
- Major trading hubs (e.g., Mid-C, Malin, PV)
- Bilateral transmission rights
- Renewable diversity, day-ahead forecast uncertainty, real-time operations
- CAISO and WEIM footprints

Independent Simulation of Multiple Time Horizons

PSO simulates multiple independent decision cycles to capture day-ahead vs. real-time unit commitment and dispatch

D-1 (am)	D-1 (~noon)	D-1 (pm-D)	D
DA Bilateral Markets	**Day-Ahead Market**	**Intra-Day Markets**	**EIM (RT Balancing)**
• DA block trades on long-term transmission rights and incremental transmission	• CAISO, EDAM, and RTO market clearing • Hourly intertie trading • Hourly trading with long-term transmission rights	• Hourly bilateral trades on remaining transmission	• EIM/CAISO trading of economic energy • Transmission released for EIM • RT balancing in BAAs

Independent real-time decision cycle used to simulate EIM functions

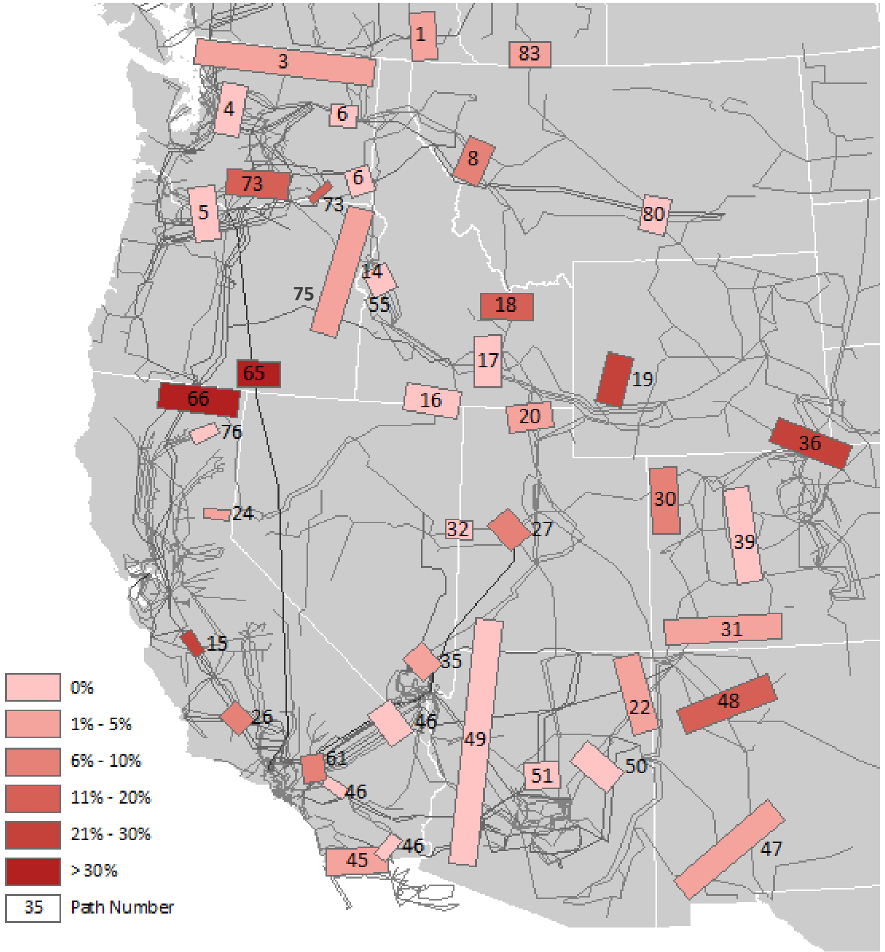
DA Unit Commitment Cycle → **DA Economic Dispatch Cycle** → **Real Time Cycle**

Decision cycles capture bilateral trading, market clearing, BAA functions in DA and RT, and market cycles (incl. EDAM "GHG reference" pass, EDAM market, and EIM)

Independent real-time decision cycle used to simulate DA vs. RT, including <u>forecast errors</u> for wind and solar

Nodal Simulations Based on Physical Transmission

WECC-Defined Paths Modeled



Limits on the physical transmission system include all the paths defined in WECC Path Rating Catalogue

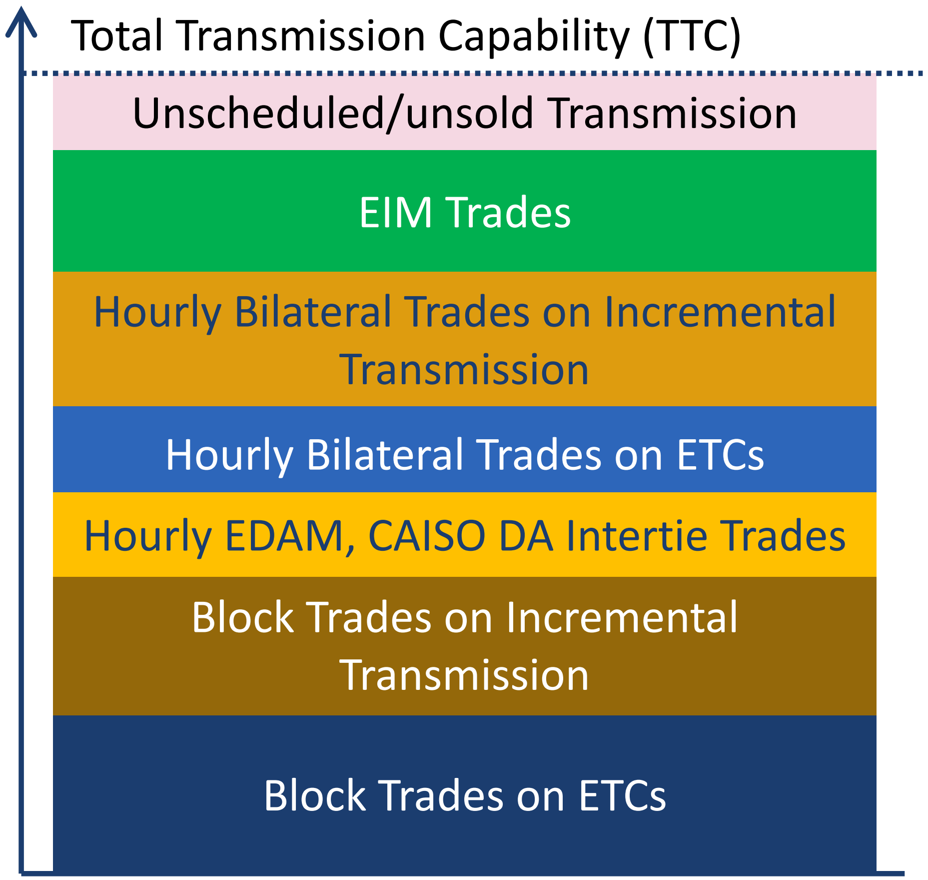
- Added CAISO and PAC constraints
- Additional transmission paths to represent congestion internal to each BA
- Limits on all paths and constraints reflect updates provided by the EDAM study participants
- Option: implement hourly or seasonal derates on WECC paths or other constraints added to the model

Types of Trades and Transmission Reservations Modelled

Our model simulates the use of different types of contract-path transmission reservations for bilateral trading across DA and RT

- Existing long-term transmission contracts (ETCs) and incrementally purchased transmission
- Total reservations on each contract path is limited by the total transfer capability (TTC)
- Trades are structured as blocks or hourly
- Bilateral trades between BAs, at major hubs, or across CAISO interties
- Account for renewable diversity and day-ahead forecast uncertainty vs. real-time operations
- Unscheduled transfer capability released for EIM trades in real-time

Types of Trades Modeled



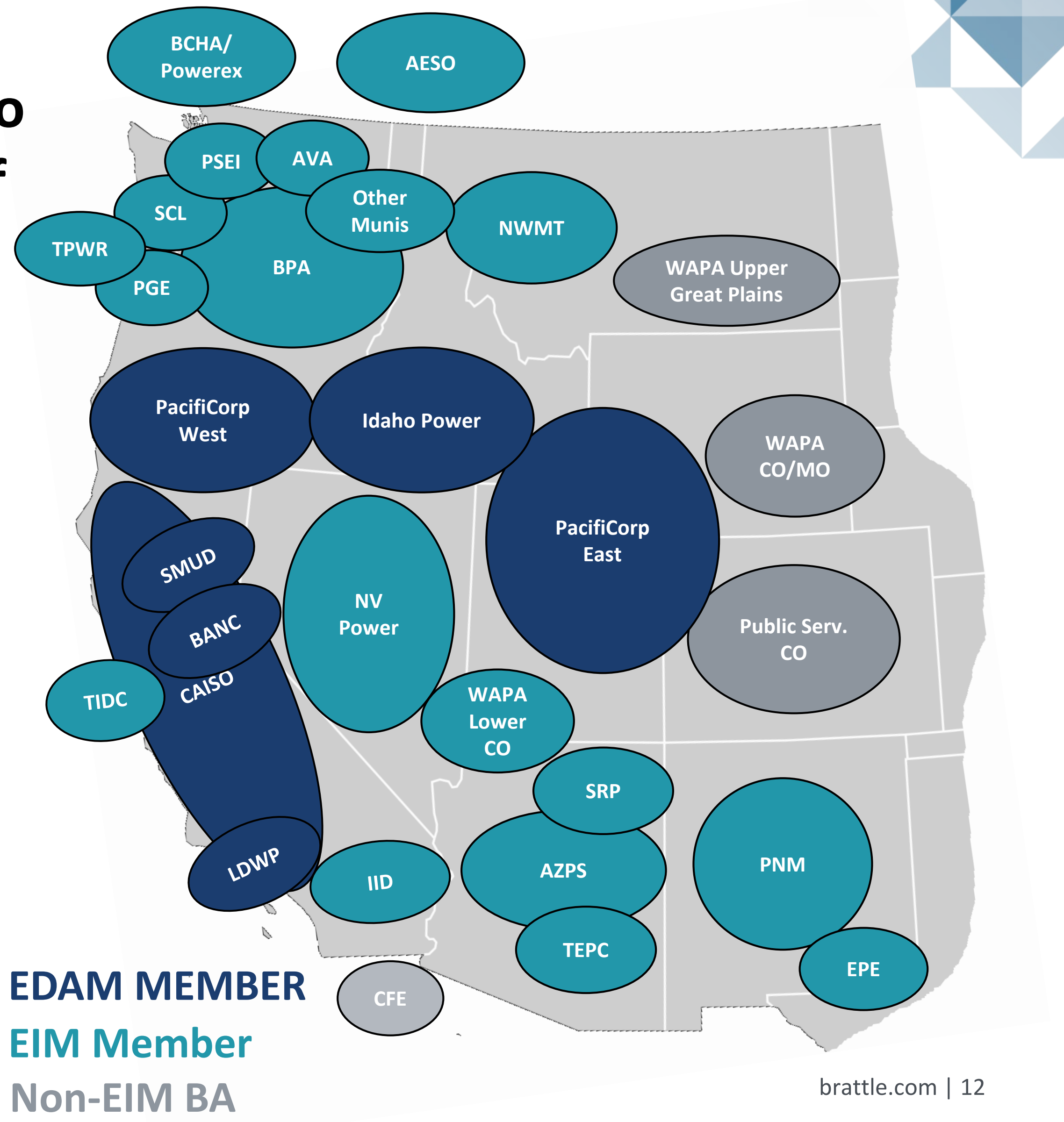
EDAM Modeling Assumptions

Modeling Assumptions: EDAM Footprint and Study Year

Simulations are based on 2032 as a proxy year to represent annual benefits for the first decade of EDAM operations

The simulated EDAM footprint includes:

- **PacifiCorp**, broken into PAC-East (PACE), PAC-West (PACW), and PAC-West in Washington (PAWA)
- The **California ISO** (CAISO)
- **Idaho Power** (IPCO)
- **Los Angeles** Department of Water and Power (LADWP)
- The **Balancing Authority of Northern California**
  – Broken into SMUD (Sacramento) and Rest of BANC



EDAM Modeling Assumptions: Generation, Gas Prices, Reserves

Total capacity in assumed EDAM footprint: nearly **200 GW**

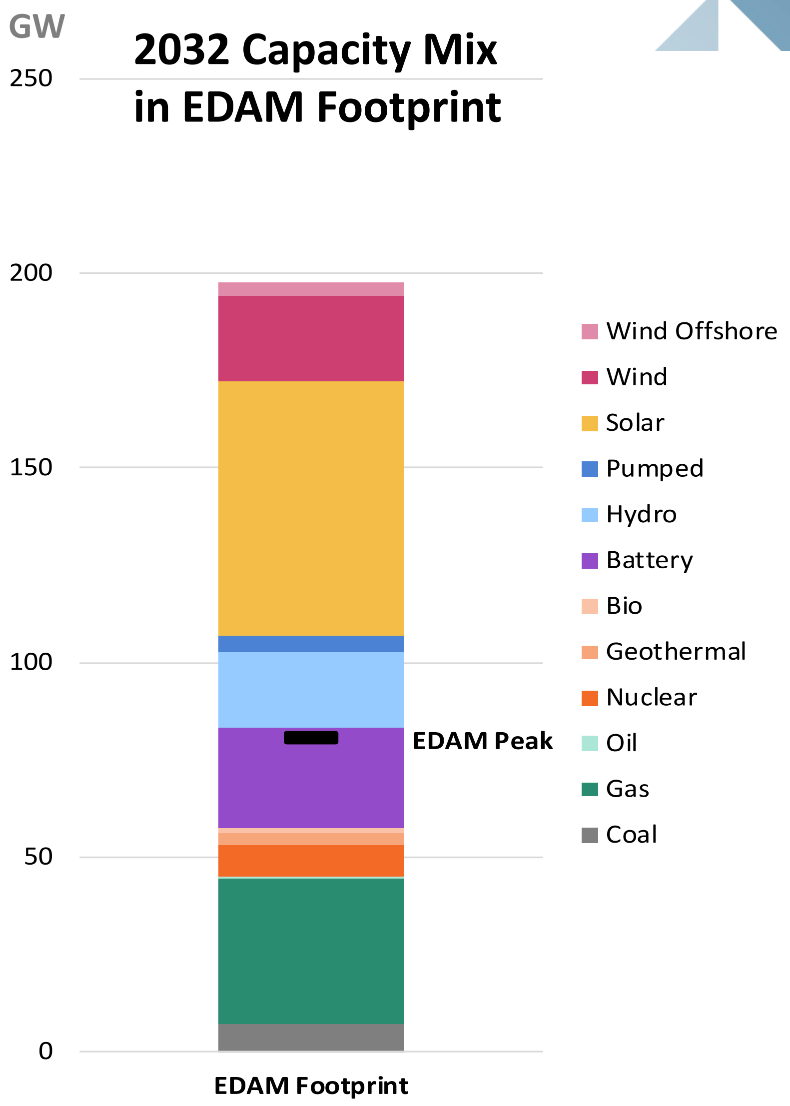
- Resource mix based on published plans as of Fall 2022
- Dispatchable capacity (including battery and hydro) exceeds EDAM peak by ~40 GW
- Solar capacity by 2032 is nearly 100 GW, with a significant portion from CAISO

Gas Price Forecast

- Compared the data from multiple participants at SoCal, Kern, Malin, and Sumas, and are using the middle forecast of the group, which shows prices between $4-5/MMBtu (2022$)

Imbalance Reserve Requirement

- EDAM reserve requirement estimated to fall about 2 GW/hr in the EDAM Case (relative to Base Case) due to the diversity benefit achieved by the EDAM footprint



EDAM Modeling Assumptions: Resource Sufficiency, Transmission

Resource Sufficiency Test

- The EDAM Straw Proposal applies the Resource Sufficiency Test to each EDAM member the day prior to real-time, before day-ahead market operations
  - In the 2019 EDAM Feasibility Study, E3 conducted an hourly analysis of Resource Sufficiency for each proposed EDAM member at that time
    - In that analysis, failure of the test was extremely rare
    - In fact, all current study participants (BANC, CAISO, IPCO, LADWP, SMUD, and PAC) previously passed the resource sufficiency test in all hours
  - For this study, conducted ex-post check and confirmed that all assumed EDAM members are resource sufficient in all hours

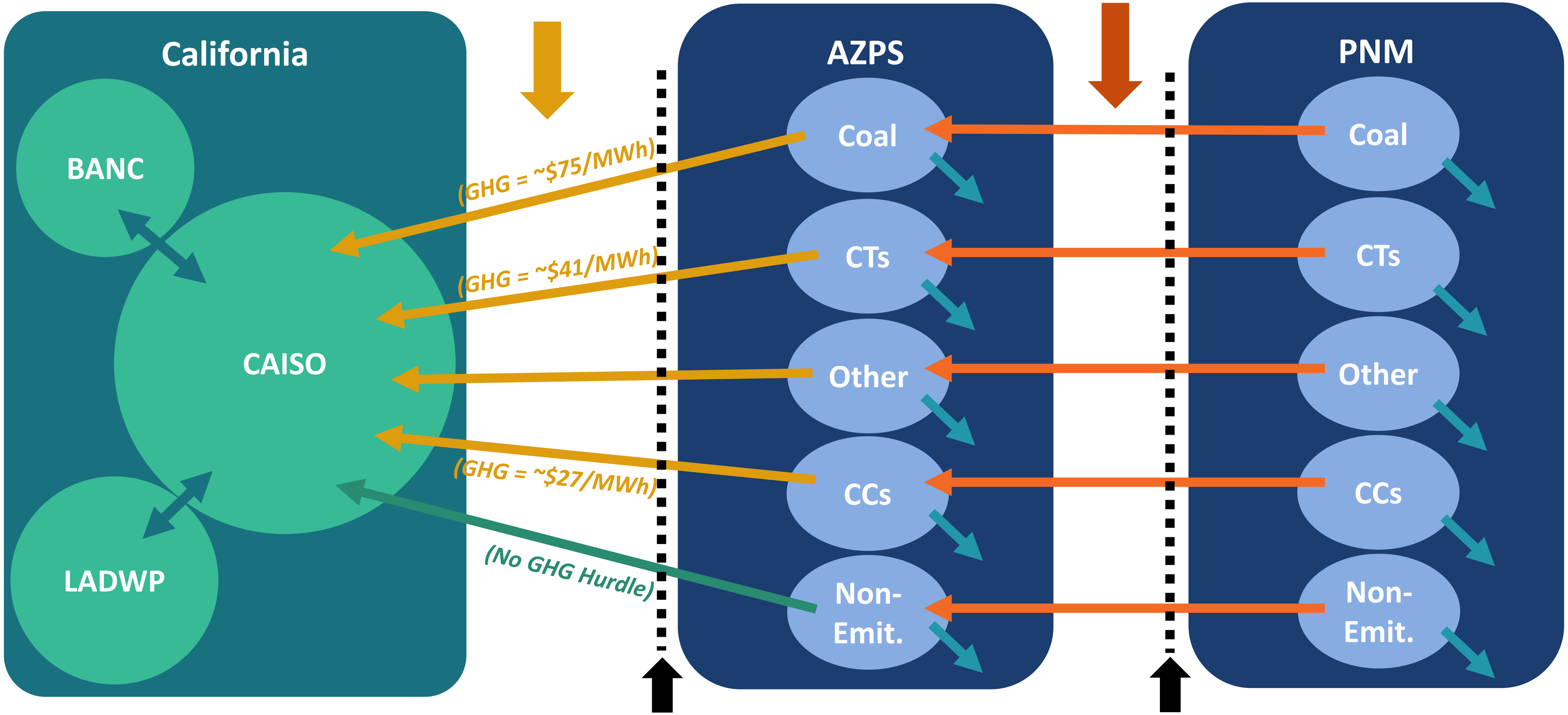
EDAM Transmission

- All three buckets of EDAM transmission are modeled and assumed to be hurdle-free:
  - Bucket 1: Transmission to Support Resource Sufficiency
    - Includes existing long-term transmission contracts (“ETCs”) for energy used for sufficiency accounting purposes
  - Bucket 2: “Donated” Transmission Contracts
    - Existing transmission contracts (ETCs) made available (“donated”) to the EDAM by participants
  - Bucket 3: Unsold Firm Transmission
    - Remaining transmission made available for EDAM (participants might hold back from transmission for block trading)
- Simulated Bucket 1 and 2 EDAM transmission equals total ETC capacity; Bucket 3 transmission equals the remaining transfer capability (i.e., TTC less ETC) between the assumed EDAM members

EDAM GHG Structure: Illustration

Sales incur unit GHG cost, relevant hurdles, and are limited by attributions from the GHG Reference Pass

Resources can sell into neighboring BAAs by paying applicable fees:
- **Bilateral market: OATT fee, trading margin**
- **EIM: no hurdle on available transmission**
- **EDAM: no hurdle on Buckets 1,2, & 3**



Resources serve load in their own BAA with no hurdle

Flows restricted to BAA export limit
+ BAA Net Export GHG Attribution Limit

A nomogram restricting total BAA-to-BAA flows to export limit, which varies by market type – bilateral, EIM, and EDAM

EDAM GHG Structure: "Reference Cycle"

Our GHG modeling structure accounts for two constraints specified in the EDAM design for GHG attributions relative to a baseline from EDAM's "reference pass" cycle, which we simulate as well

1. **Resource Specific GHG Attribution (resource-type attribution under proposed approach) =**

max{0, min{GHG Bid, UEL – Reference Pass, Optimal Dispatch}}

Simulations assume resources bid all their capacity into the GHG Region

Calculated using results of our GHG Reference Pass run

GHG attribution cannot exceed final dispatch of resource

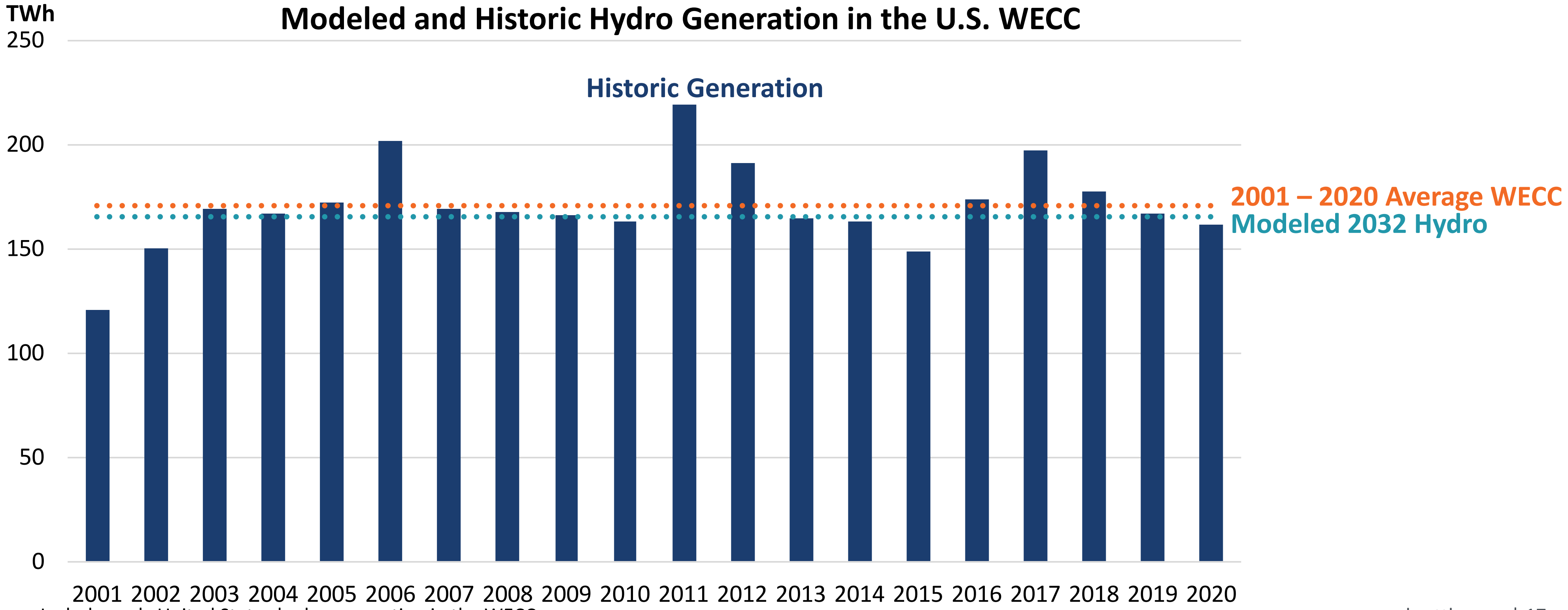
2. **BAA Total GHG Attribution <= (Net TTC Difference - BAA Net Exports hourly in reference pass)**

These reference pass results set **hourly export limits** that are enforced in the actual EDAM case for EIM and EDAM members for sales to GHG balancing authorities

EDAM Modeling Assumptions: Hydro Generation

Modeled hydro generation reflects an “Average year” in the WECC, with **total generation at 165 TWh**

- Most hydro generation is “load following”; smaller share of hydro resources is able to follow the market



Includes only United States hydro generation in the WECC.

Imbalance Reserve Requirement

EDAM reserve requirement estimated to fall about 2 GW/hr in the EDAM Case (relative to Base Case) due to the diversity benefit achieved by the EDAM footprint

Imbalance Reserve is a new reserve product being implemented by the CAISO as part of their DA Market Enhancements (DAME) initiative, and will apply to EDAM

- The Imbalance Reserve requirement (up and down) will be set to meet the 97.5 percentile of each BAAs historical net load variability
- In EDAM, participants' Imbalance Reserve Requirement will be reduced by the diversity benefit created by pooling commitment and dispatch across the regional footprint
- Does not impact other operating reserve types – regulation, contingency, etc.
- **Brattle Assumption:** we calculated each EDAM participants Imbalance Reserve Requirement and the EDAM diversity benefit to reduce each member's requirement

Summary of Base Case vs. Change Case Assumptions

The EDAM Case differs from the Base Case in terms of assumed transmission costs, GHG trading structure, reserve limits, transmission paths, and a removed limit on CAISO bilateral/EIM exports

Assumptions Summary: Base Case vs. EDAM Case

Model Assumptions	Base Case	EDAM Case
Transmission Between EDAM Entities	Trading **hurdles varied by type of trade** (block, CAISO intertie, bilateral), market cycle (DA Commitment, DA Dispatch, RT/EIM), and transmission (ETCs, hourly)	Fully optimized, **hurdle-free EDAM transmission**
Transmission Limits	Base limits (both physical and contract path) provided by study participants	Unlocks path from **PACE to CAISO** in EDAM using converted rights at IPP/Mona
Unit Commitment	**BA-specific**, with trading allowed at OATT + $8/MWh friction	Entire EDAM footprint optimized, **trading with no hurdles during commitment**
Reserves	BA-specific requirements **served individually**	**Optimized across entire EDAM footprint**
Imbalance Reserve Product	BA-specific requirements **served individually**	**Optimized across entire EDAM with 35% reduction in total requirement** (due to resource diversity)
CAISO Export Limit (as proxy for bilateral trading limits)	5 GW per hour limit in unit commitment, 7 GW per hour limit in economic dispatch or EIM	No limit
EDAM Non-GHG Exports to EDAM GHG Region	**Day ahead generic import hurdle** for all sales equal to a gas CC emissions rate (~$30/MWh)	**Unit-type specific hurdle rates**, with trading limits based on the GHG reference pass

PacifiCorp-Specific Modeling Assumptions

- PacifiCorp was modeled **as 3 separate areas**, PAC-East (PACE), PAC-West (PACW), and PAC-Washington (PAWA)
  – PAWA is the Washington piece of PACW, modeled as a separate area because it is in a GHG regulation zone in Washington state by 2032
- We modeled the **PAC 2021 IRP resource mix**, with some minor updates including the new advanced nuclear units PAC is aiming to build
- We also modeled PacifiCorp's planned transmission assets
  – Gateway West, Gateway South, B2H
- Other details for PAC include:
  – Summer NOX pricing for relevant units to reflect emissions regulations
  – Forecast errors, provided by PacifiCorp on a unit-specific basis (and for load overall)
  – Careful review of transmission limits, discussed in detail with Idaho, CAISO, and PAC transmission teams

EDAM Footprint-Wide Results

Benefit Metric: Adjusted Production Cost

Adjusted Production Cost (APC) is a standard metric used to capture the direct variable energy-related costs from a customer impact perspective

The APC is the sum of production costs and purchased power less off-system sales revenue:

(+) Production costs (fuel, startup, variable O&M, emissions costs) for generation owned or contracted by the load-serving entities

(+) Cost of bilateral and market purchases valued at the BAA's load-weighted energy price ("Load LMP")

(−) Revenues from bilateral and market sales valued at the BAA's generation-weighted energy price ("Gen LMP")

The APC is calculated for the Status Quo Case and the RTO case to determine the RTO-related reduction in APC

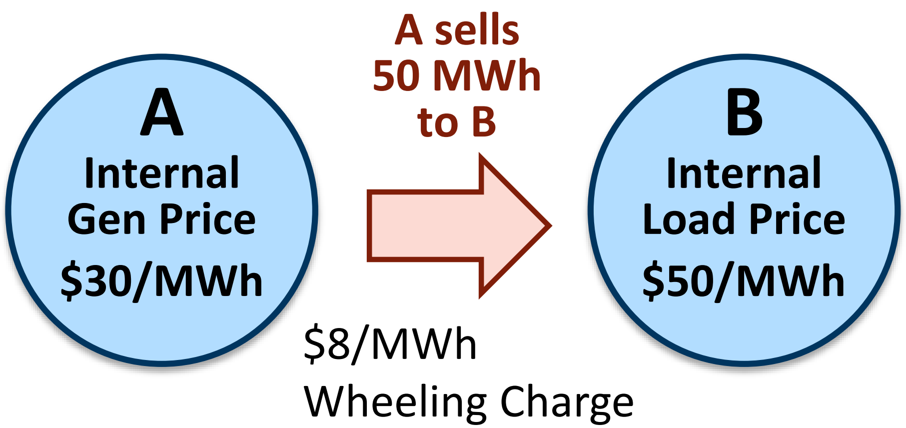
- By using the generation price of the exporter and load price of the importer for sales revenues and purchase costs, the <u>APC metric does not capture wheeling revenues and the remaining portion of the value of the trade to the counterparties</u> (see next slide)

Operational Benefit Metrics: Wheeling Revenues, Trading Gains

Based on the simulation results, we also estimate several additional impacts from increased trading facilitated by the market reforms, which is not fully captured in APC.

- **Wheeling Revenues:** collected by the exporting BAAs based on OATT rates
- **Trading Gains:** buyer and seller split 50/50 the trading margin (and congestion revenues in WEIS/RTO)

EXAMPLE: Bilateral Trade



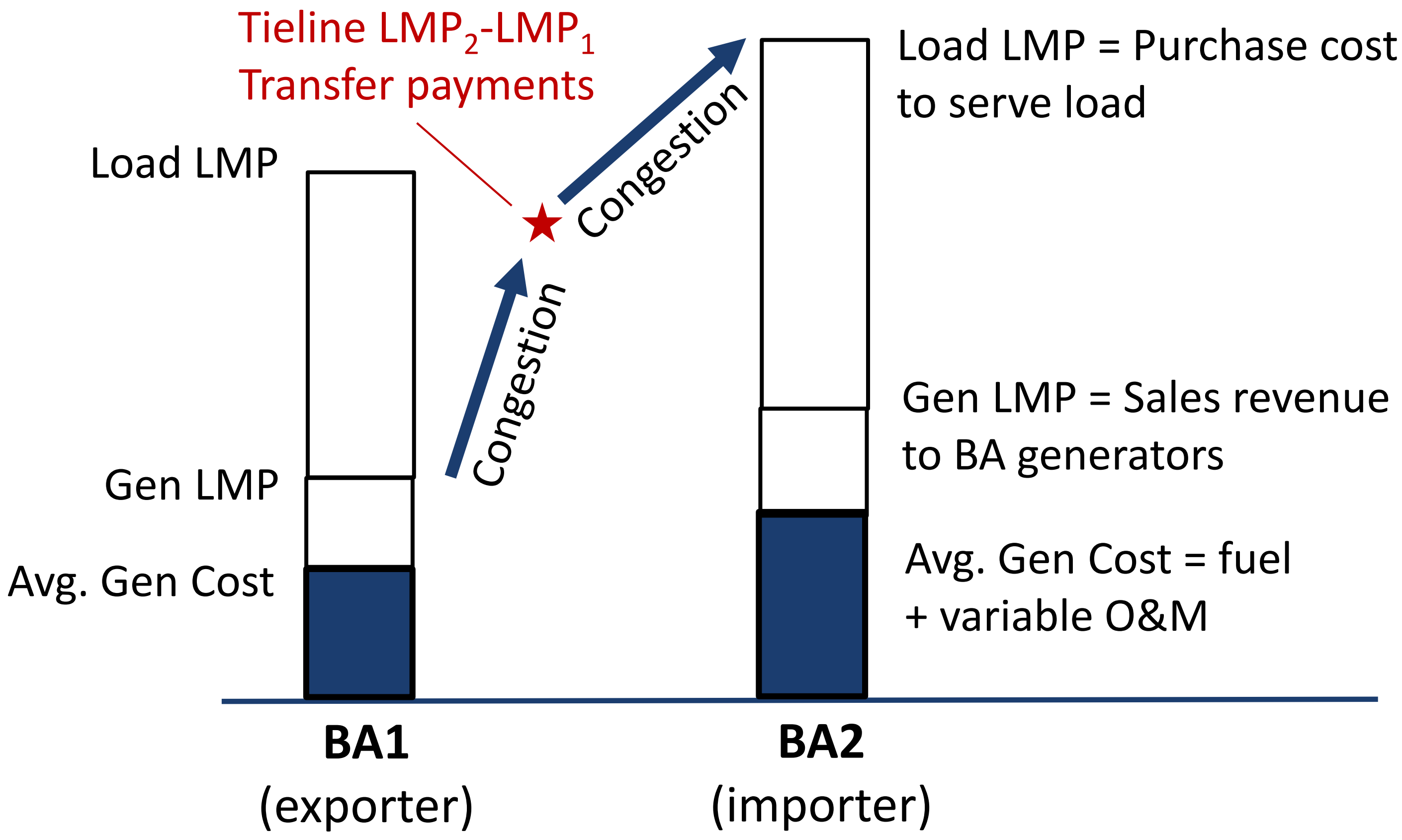
The <u>APC metric</u> only uses area-internal prices for purchase cost and sales revenues, which does not capture part of the value:

- A receives $30×50MWh=$1,500 in APC sales revenues
- B pays $50×50MWh=$2,500 in APC purchase costs
- ➔ $1,000 of trading value not captured in APC metric

Trading value = $20/MWh Δprice x 50 MWh = $1000

- Exporter A receives wheeling revenues: $8/MWh x 50MWh = $400
- Remaining $600 trading gain split 50/50: both A and B receive $300

Illustration of APC and EDAM Congestion and Transfer Revenues



EDAM congestion and transfer revenues estimated based on individual tieline LMPs:

- **Congestion Payment (to exporter)**
  = MW x (Tie LMP_1 – Gen LMP_1)
- **Congestion Payment (to importer)**
  = MW x (Load LMP_2 – Tie LMP_2)
- **Transfer Payment (split 50/50)**
  = MW x (Tie LMP_2 – Tie LMP_1)

Summary of 2032 EDAM Footprint-Wide Benefits

The assumed EDAM footprint (incl. CAISO) is estimated to see gross benefits of $810 million/year, with net benefits estimated at $438 million.

Benefits driven by 50 TWh increase in day-ahead trades between the assumed EDAM participants, with significant EDAM congestion and transfer revenues

EDAM Benefits ($ millions/year)

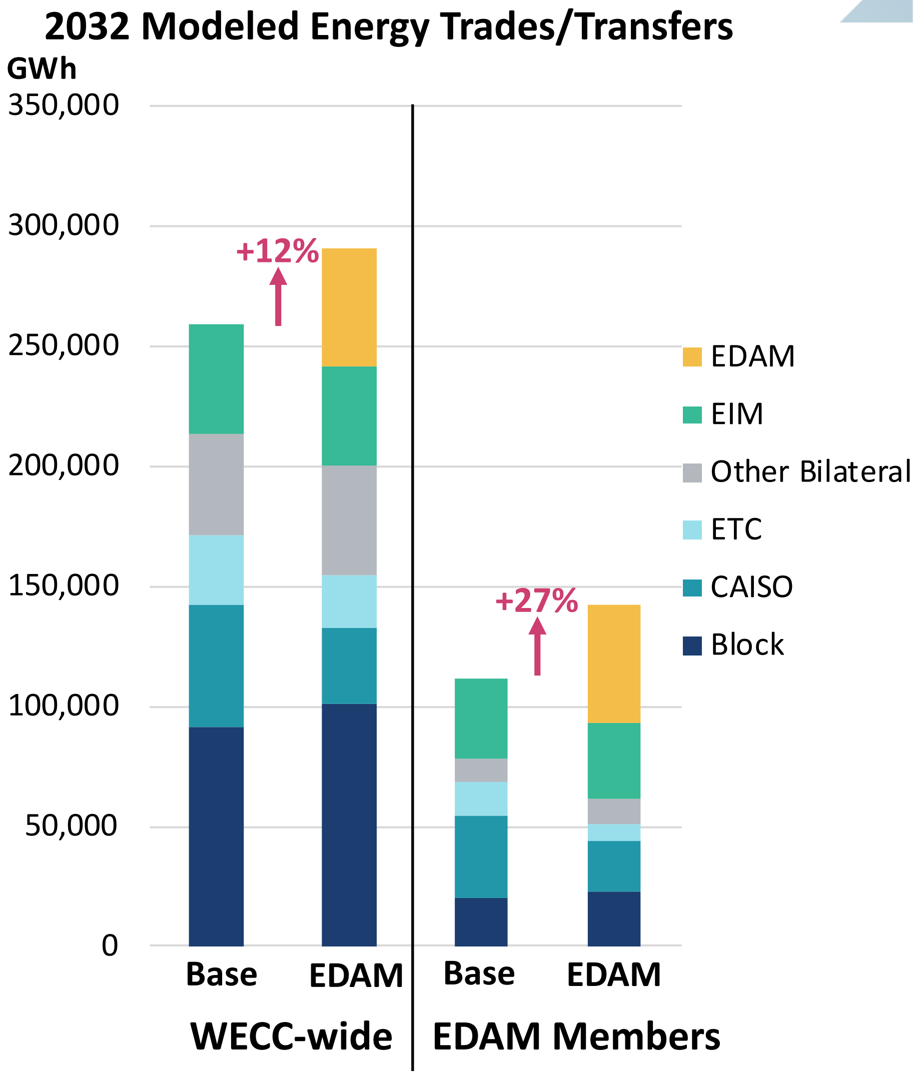
Benefit Metric	Modeled EDAM Footprint
EDAM Benefits	
Adjusted Production Cost Savings	$134
EDAM Congestion Revenues	$269
EDAM Transfer Revenues	$409
Total EDAM Benefits	**$813**
Other EDAM Related Impacts	
Impact on Wheeling Revenues	-$103
TRR Settlements *[1]*	$0
Impact on EIM Congestion Revenues	-$16
Impact on CAISO DA Tieline Trading Value	-$57
Reduced Bilateral Trading Value *[2]*	-$199
Net EDAM Benefits	**$438**

Notes:
[1] TRR settlements (hold harmless for lost wheeling revenues) are zero for footprint
[2] Reduced bilateral trading values of exports and imports from the BAs of EDAM members, includes impacts on trades by third-party marketers.

Total BA-to-BA Transfers by Trade Type

The EDAM market **enables a 12% increase in overall WECC transfers/trades**, and a 27% increase directly for the EDAM members

- Total WECC trading increases ~30 TWh due to the EDAM market
- New WECC trading comes from block trades (+11%), and hourly bilateral trading (+7%)
- Trading volumes decrease in EIM (-9%), for CAISO intertie trades (-39%), and hourly trades on long-term ETCs (-23%)
- **Total EDAM transactions: 51 TWh**

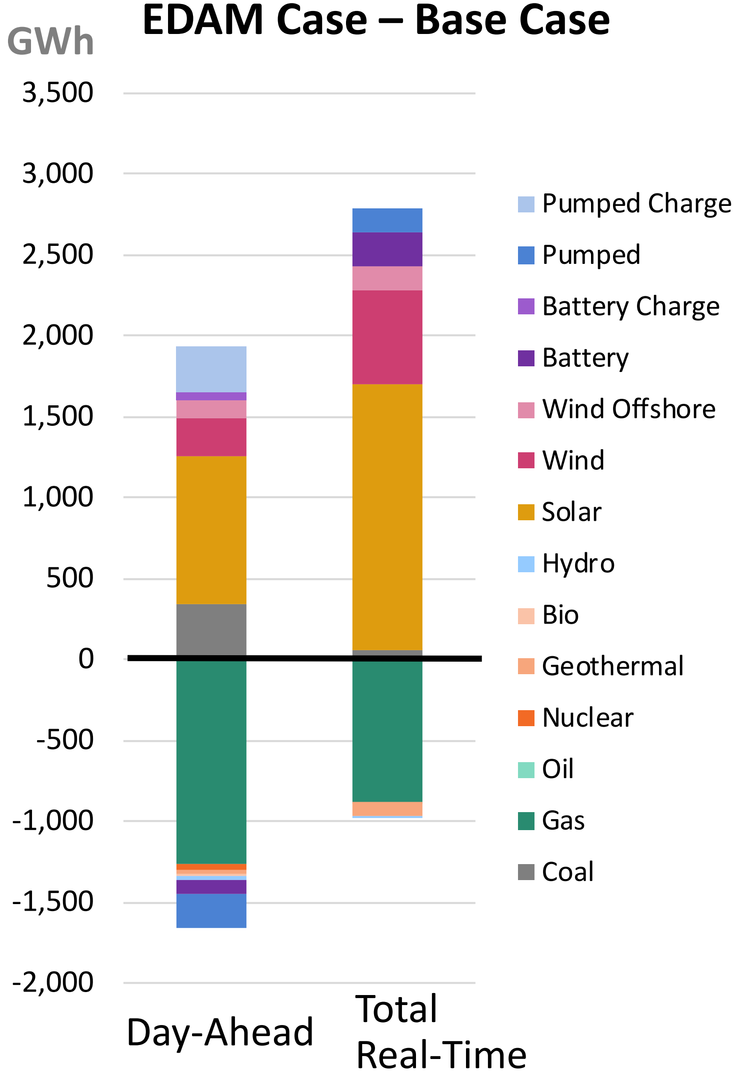


Generation Change: Base Case to EDAM (DA and RT)

EDAM enables beneficial shifts in the generation mix to achieve production cost savings and emissions reductions

- Renewable curtailments fall ~1,200 GWh in day-ahead, ~2,400 GWh in real-time
- In day-ahead, reduced renewable curtailments displaces mostly gas
- In real-time, the simulated EDAM footprint exports more renewables (due to lower curtailments) and gas generation to the non-EDAM portion of the EIM footprint
  - Overall, gas generation is lower due to implementation of EDAM
- Emissions are lower in EDAM, EIM, and WECC (see slide 34)

2032 EDAM Footprint Generation Change
EDAM Case – Base Case



Estimated EDAM Benefits are Conservatively Low

The estimated benefits are likely understated due to several factors:

- <u>Overstated base-case efficiency</u>: Our simulation of the status quo is more efficient than reality. For example, the Base Case assumes that balancing authorities have optimal security-constrained unit-commitment and dispatch (SCED) in both DA and RT, making the simulated dispatch more optimal than in reality.
- <u>Overstated transmission utilization by bilateral markets</u>. Inefficient utilization of transmission in bilateral markets is not modeled, which means the simulations understate the extent to which EDAM will be able to make better use of available transmission. This effect is magnified by (a) transmission outages (which magnify the benefit of SCED-based congestion management in EDAM) and (b) unrealistically optimized BA-to-BA contract-path transactions that can fully utilize long-term transmission contracts before purchasing short-term transmission.
- <u>Normalized loads and fuel prices</u>. Other than single heat-wave and cold-snap weeks, the model is weather-normalized loads and smooth seasonal fuel prices (without any daily volatility). Challenging market conditions (such during as the December 2023 gas price spikes) will magnify EDAM benefits (as the EIM experience in 3Q of 2021 and 3Q-4Q of 2022 have shown). The Base Case does not reflect the limited liquidity of bilateral market during such challenging market conditions.
- <u>No capacity benefits quantified</u>: We have not quantified the extent to which EDAM may reduce investment costs associated with lower operating reserve requirements.
- <u>Limited EDAM footprint</u>: Like in EIM, EDAM benefits will increase as more parties join EDAM

PacifiCorp Results

FOR PACIFICORP EAST, WEST, AND WASHINGTON

PacifiCorp's EDAM Benefits

PacifiCorp sees a total EDAM gross benefit of $339 million

PAC's benefit is driven by several factors:

- Significant EDAM transfer and congestion revenues
  - PAC is the **most transmission connected entity** in EDAM, with connections to ***95%*** of the modeled EDAM load (missing only BANC/SMUD)
- Large gains in sales revenues from PAC's highly competitive thermal units, especially gas
- A competitive resource mix
- Savings in purchases of inexpensive solar from CAISO/LADWP

EDAM Benefits ($ millions/year)

Benefit Metric	PACE	PACW	PAWA	PacifiCorp Total
EDAM Benefits				
Adjusted Production Cost Savings	$54	$8	$2	$64
EDAM Congestion Revenues				$37
EDAM Transfer Revenues				$238
Total EDAM Benefits				**$339**
Other EDAM Related Impacts				
Reduced Wheeling Revenues				$8
TRR Settlements *[1]*				-$6
Impact on EIM Congestion Revenues				-$12
Impact on CAISO DA Tieline Trading Value				-$1
Reduced Bilateral Trading Value *[2]*				-$147
Net EDAM Benefits				**$181**

Notes:
[1] TRR settlements are based on 2021 short-term wheeling revenues. If based on 2032 modeled revenues, this value is a loss of $17 million instead of $9 million.
[2] Reduced bilateral trading values of exports and imports from the BAs of EDAM members, includes impacts on trades by third-party marketers.

Drivers of PacifiCorp's EDAM Benefits

All PAC areas benefit from the de-pancaking EDAM creates, providing considerable new EDAM congestion and transfer revenues to PacifiCorp ($275 million)

PacifiCorp East: PACE's benefits are driven primarily by **increased dispatch of most economic gas resources when hydro and renewables generation is low** into the rest of the EDAM footprint and receiving a **better price on renewable sales**

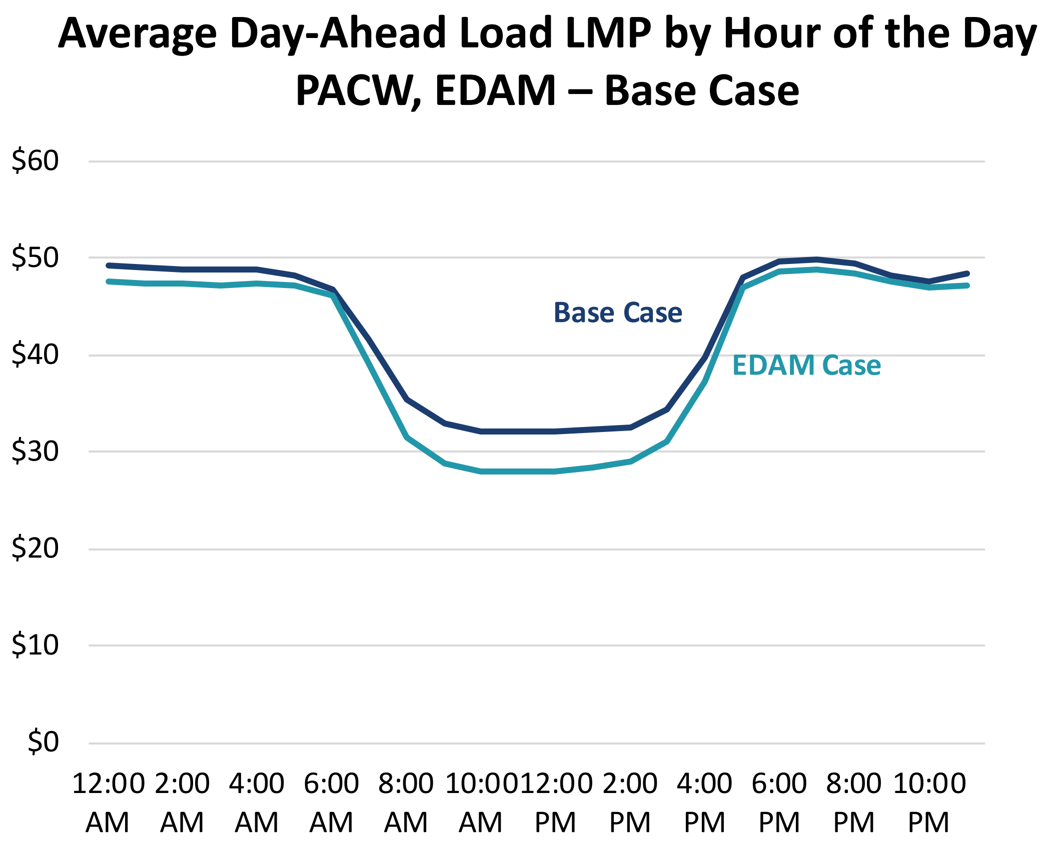
- New sales net PACE $174 million in revenues on an increase in generation costs of just $88 million, partially because of higher day-ahead average sales prices for PACE for increased sales volumes in EDAM (during evening/night hours, October through March)

PacifiCorp West & Washington: PACW and PAWA benefits are driven from **increased purchases at lower cost**, as EDAM provides cheaper power, allowing PACW to reduce thermal generation and buy from PACE, Idaho, CAISO, and others at better prices and higher volumes

PacifiCorp West Results: Lower Purchase Costs

PACW and PAWA see purchase benefits because of the availability of cheap midday solar in EDAM

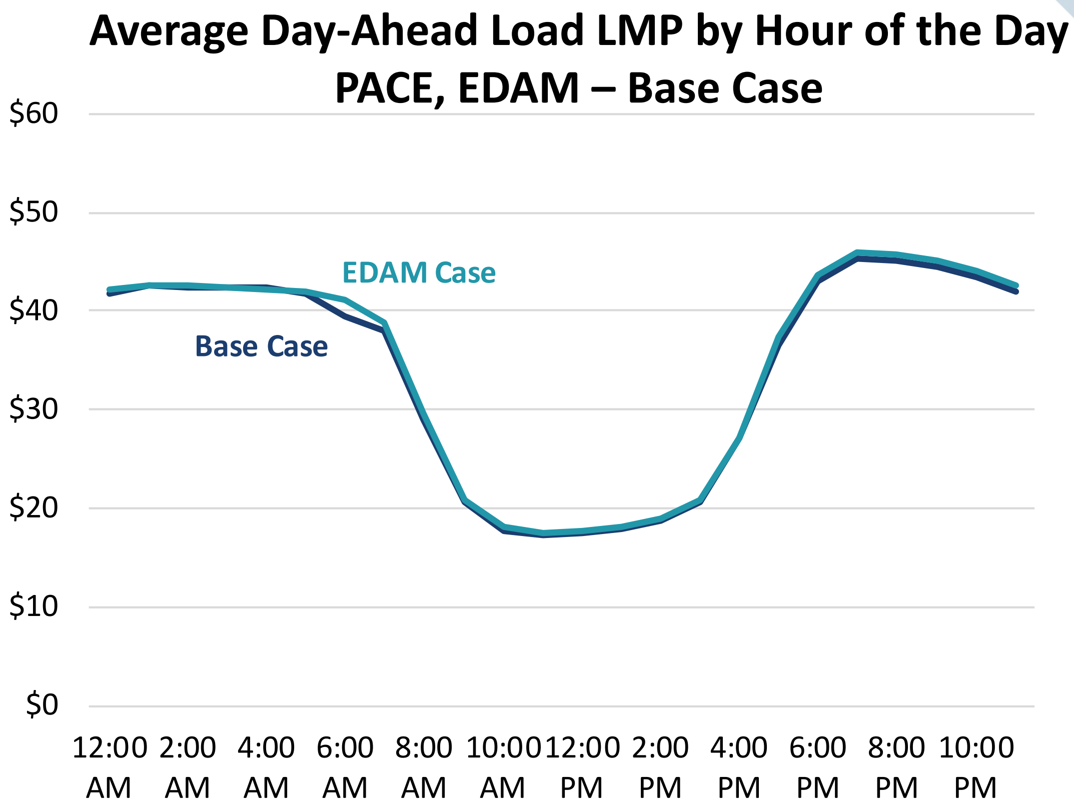
- Average load LMPs fall about $2/MWh in PACW from the base case to EDAM
- However, this drop is larger midday when average load LMPs drop about $4/MWh
- Most new PACW/PAWA purchases come from PACE, buying more solar from LADWP and CAISO, at Malin, or from Idaho Power



PacifiCorp East Results: Higher Off-System Sales Revenues

PACE sees a significant benefit in EDAM from increased sales at higher LMPs:

- Average sales prices for PACE increase by about \$3/MWh in EDAM (compared to base case) while sales increase from approx. 12 TWh to 15 TWh
  - 88% of this increase occurs during evening, night, and morning hours, October-March, when PACE's flexible thermal generation is particularly competitive in the EDAM footprint
  - Off-system sales increase by less: during the day (when surplus California solar is available), during the Spring (with high hydro), and Summer (with added NOx costs)



While average off-system sales prices increase by approximately \$3/MWh, average load LMPs are mostly unchanged (see chart)

GHG Emission Reductions: EDAM vs. Base Case

EDAM reduces emissions: both within the GHG-regions of EDAM and the remaining EDAM footprint, as well as within EIM and WECC-wide

Simulations show that EDAM's GHG design (incl. its reference pass methodology) successfully prevents significant resource reshuffling, resulting in:

- Reduced renewable generation curtailments, particularly in high-renewable areas such as CAISO
- Switching from less efficient gas units to more efficient gas units within the EDAM footprint
- WECC-wide, coal generation falls by 200 GWh
- PacifiCorp-, EDAM-, EIM-, and WECC-wide decreases of GHG emissions

Total Emissions in Million Metric Tons (2032)

	EDAM			WECC		PacifiCorp			
Case	**EDAM GHG Region**	**EDAM Non-GHG**	**Total EDAM**	**Total EIM**	**Total WECC**	**PAWA**	**Rest of PACW**	**PACE**	**Total PAC**
Base Case	16.31	19.31	35.62	125.37	170.70	0.12	2.06	15.96	18.14
EDAM Case	15.78	19.20	34.98	125.13	170.42	0.04	1.15	16.91	18.10
EDAM - Base	***-0.54***	***-0.11***	***-0.65***	***-0.24***	***-0.29***	***-0.08***	***-0.91***	***0.95***	***-0.04***

Acronyms

ADS	Anchor Data Set (WECC)
AESO	Alberta Electric System Operator
APC	Adjusted Production Costs
AVA	Avista Corporation
AZPS	Arizona Public Service Company
B2H	Boardman to Hemingway Transmission Line
BA	Balancing Authority
BAA	Balancing Authority Area
BANC	Balancing Authority of Northern California
BCHA	British Columbia Hydro and Power Authority
BPA	Bonneville Power Administration
CAISO	California Independent System Operator
CC	Combined Cycle generator
CFE	Comision Federal de Electricidad (Mexico)
CO/MO	Colorado/Montana
CT	Combustion Turbine generator
DA	Day Ahead
DAME	Day Ahead Market Enhancement
EDAM	Extended Day Ahead Market
EIM	Energy Imbalance Market
EPE	El Paso Electric Company
ETC	Existing (long-term) Transmission Contract
GHG	Greenhouse Gas
GW	Gigawatt
GWh	Gigawatt Hour
GW/hr	Gigawatt/Hour
IID	Imperial Irrigation District
IPCO	Idaho Power Company
ISO	Independent System Operator
kW	kilowatt
LADWP	Los Angeles Department of Water and Power
LMP	Locational Marginal Price
MMBtu	Million British Thermal Units
MWh	Megawatt Hours
NOx	Nitrogen Oxides
NV	NV Energy (Nevada)
NWMT	Northwestern Energy (Montana)
O&M	Operations & Maintenance
OATT	Open Access Transmission Tariff
PAC	PacificCorp
PACE	PacificCorp East
PACW	PacificCorp West
PAWA	PacificCorp West in Washington
PGE	Portland General Electric Company
PNM	Public Service Company of New Mexico
PSEI	Puget Sound Energy
PSO	Polaris Power System Optimizer
PV	Photo Voltaic
RT	Real Time
RTO	Regional Transmission Organization
SCED	Security Constrained Economic Dispatch
SCL	Seattle City Light
SMUD	Sacramento Municipal Utility District
SRP	Salt River Project
TEPC	Tucson Electric Power Company
TIDC	Turlock Irrigation District
TPWR	City of Tacoma, Department of Public Utilities
TTC	Total Transmission Capability
TWh	Terrawatt Hour
UEL	Upper Electrical Limit
WAPA	Western Area Power Administration
WECC	Western Electricity Coordinating Council
WEIM	Western Energy Imbalance Market