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## **Essential Role of Markets**

Western Electricity System Integration Workshop

December 2, 2022

Prepared for:



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Energy Market Services: An Overview



Primer on Forecasting Market Benefits 3 Breaking Down Benefit Drivers

 Implications for Policy & Planning Decisions

5 Appendices (References)





## Energy Market Services: A *Generic* Reference Sheet

Market Service	Bilateral Market	Real-Time Market	Day-Ahead Market	RTO
Centrally optimized dispatch	No central optimization	Centrally optimized real-time dispatch; day-ahead unit commitment not optimized	Centrally optimized real-time dispat	ch and day-ahead unit commitment/dispatch
Transmission wheeling	Fee applies to all transactions	No fee for in-market real-time transactions	No or nominal fee for in-market real-time and day-ahead transactions	No wheeling fees (except for exports)
Transmission available to market	Transmission rights required for all transfers	Can vary widely depending on market be available	design – some or all capacity could	Transmission capacity available up to reliability limit
Transmission planning	Local planning by individual transmiss Order 1000 remain as they are today	sion providers; regional planning and int	erregional coordination under	Joint transmission planning by RTO; some lower voltage transmission planning remains at the local level
Tariffs and Operational Control of Transmission	Individual transmission providers reta	in control and have tariffs		RTO provides functional control of system, joint tariff
Reliability Obligations and Balancing Authority Boundaries	BAs are retained, have primary reliab	ility obligations		RTO has primary reliability obligations; BAs consolidated
Ancillary Services and Co- Optimization	No optimization, reserve sharing groups	Can have optimization and ancillary se	ervice products	Ancillary service co-optimization and provision in the market
<b>Resource Adequacy Function</b> Note: separate RA programs could also be developed and overlayed across these markets	Addressed by individual regulators; no market requirement	Market addresses intra-hour resource sufficiency, but does not impact long-term resource adequacy planning and processes	Market addresses day-ahead resource sufficiency. Depending on design, could impact long-term resource adequacy planning	Market can include its own longer-term resource adequacy requirements that must be achieved
Transparent Access to Market & Operational Information	Very little access to information, what is available is generally aggregated	Transparent access to pricing information for real-time transactions and transmission in the market	Transparent access to pricing information for day-ahead and real-time transactions and transmission in the market	Transparent access to pricing information for day- ahead and real-time transactions and transmission in the market

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## Energy Market Services: Where things stand today (roughly)

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## **Energy Market Benefits: Categorizing Savings**

- Energy markets produce efficiencies (and savings) by changing the way we operate and plan our systems
  - Not all such savings are quantifiable and some of the largest are commonly overlooked
- While they are often the most referenced benefit category, operational savings from energy markets generally reflect a relatively small portion of the total benefits created by organized wholesale energy markets

### Market Benefit Categories

Operational

Savings

Capacity

Savings

**Other Energy Related** 

Savings

#### **Description**

Savings due to more efficient dispatch (via SCED), more efficient management of transmission capacity, lower operating reserve requirements, removal of transmission wheeling costs within market footprint, decrease in trading friction

Savings due to lower and regionally shared planning reserve requirements caused by geographical diversity of loads (and generation)

Savings due to more efficient planning of the transmission system, access to lower-cost public policy resources, environmental benefits of reduced emissions, new market products (e.g., hourly vs. block), increased automation of system operations

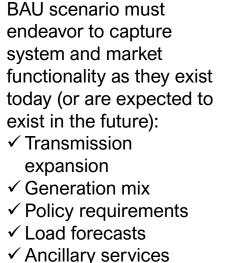
**Non-Energy Savings** 

Savings due to lower electricity prices causing indirect economy-wide benefits such as new jobs, changes to household spending, and economic growth

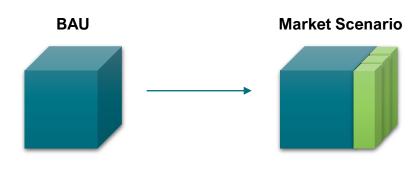


## Energy Market Benefits: Study Framework

- Operational benefits of new wholesale energy markets are commonly quantified using production cost modeling software
  - These simulation tools are "security constrained economic dispatch" models that perform an optimization not unlike the market engines used by RTOs/ISOs



### **Study Setup**



BAU - Market Scenario = Benefit \$\$\$

Market modeling "modules" bolted on to BAU scenario to reflect new wholesale energy market function. Can include modeling of:

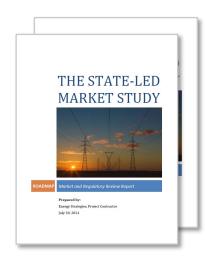
- ✓ Wheeling cost
- ✓ Transmission availability
- ✓ Ancillary service products
- ✓ BA consolidation

### **Typical Software**

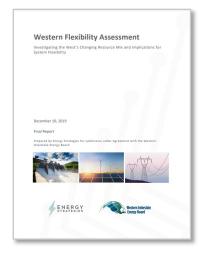
- GridView
- PROMOD
- PLEXOS
- PSO
- ...etc.



## Energy Market Benefits: Related Studies by Energy Strategies



CAISO EDAM Benef	IIIS Study d the West Under EDAM Market Scenarios
Prepared for:	
😂 California ISO	Keegan Moyer Daniel Ramirez Principal knover@energystrat.com



 Materials from these studies were used to inform today's comments on market services, benefits, and implications for policy & planning

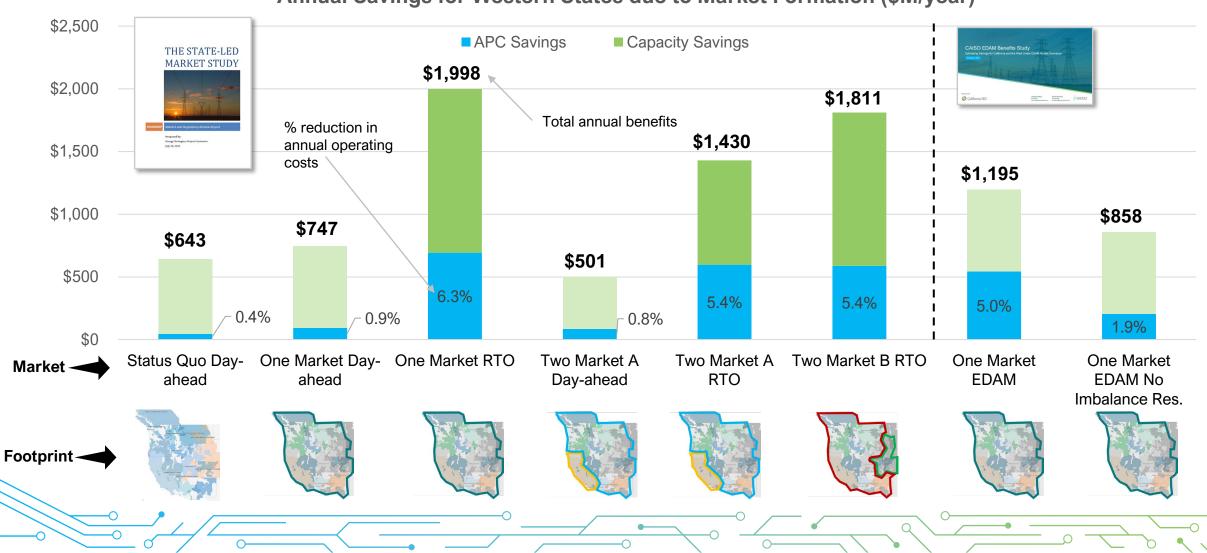
## Other important and relevant regional work covered in ACR 188

CAISO ACR 188 Study List

Legal	Enhanced Western Grid Integration: A Legal and Policy Analysis of	2017	Yale Environmental Protection Clinic	Juliana Brint, Josh Constanti, Franz	*Enhanced Western Grid Integration: A Legal and Policy Analysis
*	the Effects on California's Clean Energy Laws			Hochstrasser, and Lucy Kessler	the Effects on California's Clean Energy Laws", May 2017
legal	Regulation and Markets: Ideas for Solving the Identity Crisis	2017	Wilkenson Barker Knaur	Tony Clark	"Regulation and Markets: Ideas for Solving the Identity Crisis ". 3: 2017
egal	Evaluation of Jurisdictional and Constitutional Issues Arising from CAISD Expansion to include PacifiCorp Assets	2016	CAISO	Ann E. Carlson and William Boyd	"Evaluation of Jurisdictional and Constitutional Issues Arising from CAISO Expansion to include Particlone Assent", August 1, 2016
egal	Survey of Transmission Cost Allocation Methodologies for	2011	DOE	National Renewable Energy Laboratory	https://www.nrel.gov/docs/fy11asti/41880.pdf
darket Promos	Regional Transmission Organizations A Proposal for Southwest Power Pool's Western Day-Ahead	2022	99	SPP Staff	A Proposal for Southwest Power Pool's Western Day Ahead Ma
	Market and Related Services [DRAFT] Renefits of the SIP 8TO Expansion into the WEIS Enotociet				and Belated Services." Draft https://www.wapa.gov/About/keytopics/Documents/2022-spp-
		2022	Western Area Power Administration	Brattle	trattle-study.pdf https://www.westernpowerpool.org/private-
Aarket Proposa	NWPP Resource Adequacy Program - Detailed Design	2021	Northwest Power Pool	Northwest Power Pool	media/documents/2021-08-30 NWPP RA 28 Design v4 finals
Aarket Proposa	Extended Day-Ahead Market: Feasibility Assessment - Update from EIM Entities	2019	EIM Entities	Brattle Group and E3 Consulting	"Extended Day-Ahead Market: Feasibility Assessment - Update In (IM Entities", October 3, 2019
Aarket Proposa	Examination of Potential Benefits of an Energy Imbalance Market in the Western Interconnection	2013	DOE, PUC EIM Group	National Renewable Energy Laboratory	"Examination of Potential Benefits of an Energy Imbalance Mark in the Western Interconnection", March 2013
	Patheays rowards one becarbond atom: impacts and Opportunities for Energy Customers from Several US	2022	CEBA	Resources for the Future	https://cebi.org/research./pathways-toward-erid-decarbonization
	In Support of Western Regional Resource and Transmission	2021	Western Interconnection Regional Electricity	Gridworks, Center for the New Energy	In Support of Western Reginal Resource and Transmission Plane
	Planning Coordination Potential customer benefits of interregional transmission	2021	Dialogue (MRED) American Council on Renewable Energy	Economy Submitted by General Flectric International	Coordination", Octover 2021 "Potential customer benefits of interregional transmission",
			(ACORE)		November 29, 2021 "Transmission Benefits All Users of the Power Grid". October 11.
	Transmission Benefits All Users of the Power Grid	2021	Grid Strategies	Michael Coggin	2021 "Project of a New Western Regional Transmission Organization
Other	Prospect of a New Western Regional Transmission Organization	2021	Congressional Research Service	Congressional Research Service	September 8, 2021
Other	Designing the 21st Century Electricity System	2021	CEBA	Grid Strategies	https://cebi.org/research/designing-the-21st-century-electricity
Other	GHG Accounting Working Group Report				ate edu/wp.content/uploads/2021/01/final- ID-0HG-accounting-work-group add
Other	Renewable Energy Policy Pathways Report		11 -1.	Idiaa	esearch /renewable-energy-policy-pathways-
Other	Grid Vision: The Electric Highway to a 21st Century Economy		41 st	udies	Electric Highway to a 21st Century Economy",
	Improving Transmission Planning: Benefits, Risks, and Cost				mission Manning: Benefits, Risks, and Cost
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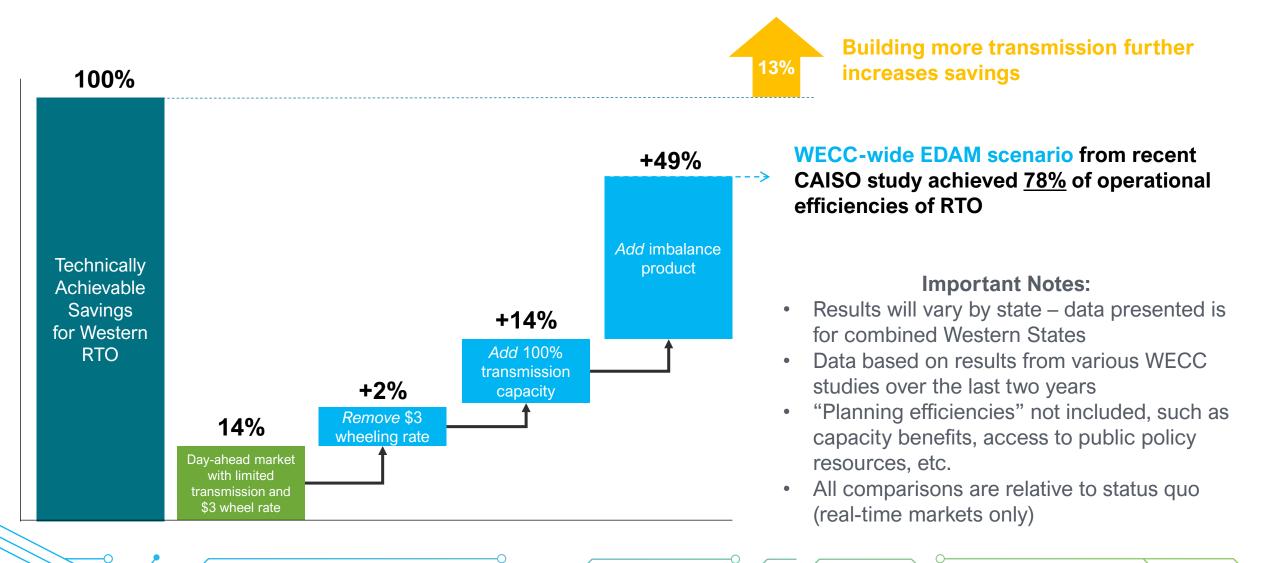
### **Forecasted Benefits for Western States**



#### Annual Savings for Western States due to Market Formation (\$M/year)



## Drivers of Operational Benefits By Market Feature





## Market Implications for Policy and Planning Decisions

 Market formation and evolution in the West will impact resource procurement and policy choices

### • For example:

- Public policy objectives that require very high penetrations of renewable energy are difficult to achieve absent a regional energy market (see *Western Flexibility Assessment*)
  - Similarly, energy markets allow policy makers to be more aggressive with the scope and timeline of carbon reduction initiatives
- Markets will increase opportunities to procure geographically diverse renewable resources, which will help bring down the cost of achieving high renewable penetrations
- Markets give clearer signals with regards to what transmission should be constructed, and when, which will
  result in unquantified but significant savings
- Markets are likely to improve reliability of the Bulk Electric System
- Market design and governance structures are key to maximizing state oversight/jurisdiction on issues that could impact implementation of policies



# Thank You!



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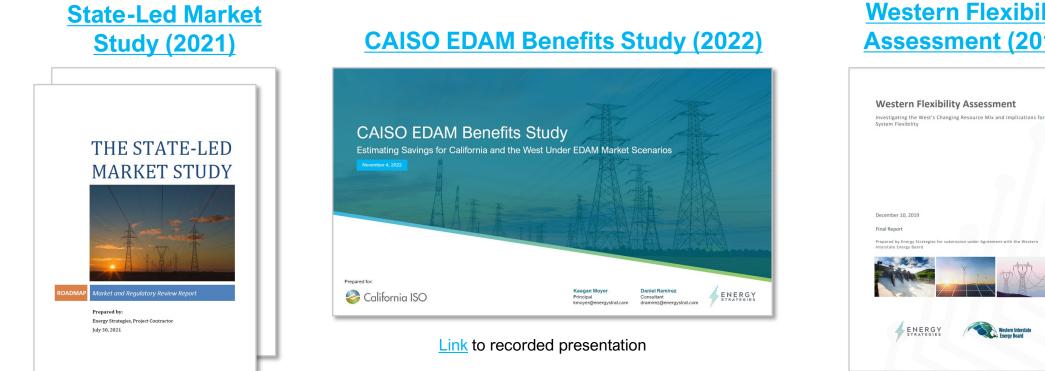
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## Appendices

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## Appendices

Links to studies referenced today: 



Link to Market and Regulatory Review



### Western Flexibility Assessment (2019)