

WELCOME

Draft Energy Storage Roadmap

Draft Matrix Stakeholder Call

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Alignment of Proposed Actions to Storage Configuration and Use Cases

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The matrix seeks to convey what actions facilitate each use case to realize energy storage contributing to the grid.

Interconnection location	Configuration	Transmission / Wholesale Participation	Distribution Application	Action		
				Detailed Action 1	Detailed Action 2	Detailed Action 3
Transmission	Stand-alone Energy Storage	All or combination Energy, Non-Spin, Spin, Regulation	None	Relative Score	Relative Score	Relative Score
...
Distribution
...
Behind the meter	Customer-sited, separate meter	All or combination Energy, Non-Spin, Spin, Regulation	Demand charge management	Relative Score	Relative Score	Relative Score
...

Where the resource connects to the grid

Technology and co-location with other resources

General and specific actions that advance energy storage

Level of impact each action has on advancing the configuration to provide grid services.

Services provided to the wholesale market / transmission grid

Services / application provided to the distribution grid / retail customer

Configurations / Applications

Interconnection Location	Configuration	Transmission Wholesale Participation	Distribution Application
Transmission	Co-located with intermittent generation	Any markets, black start, voltage, ...	-
	Co-located with conventional generation	Any markets, black start, voltage, ...	-
	Stand-alone	Any markets, black start, voltage, ...	-
Distribution	Substation Energy Storage	-	Distribution-connected UDC use*
		E,NS,SR,REG	-
	Community Energy Storage	E,NS,SR,REG	Distribution-connected UDC use*
		-	Distribution-connected UDC use*
	Standalone Energy Storage	E,NS,SR,REG	-
		E,NS,SR,REG	Distribution-connected UDC use*
		-	Distribution-connected UDC use*
	Co-located with DG	E,NS,SR,REG	-
		E,NS,SR,REG	Distribution-connected UDC use*
		-	Distribution-connected UDC use*
		E,NS,SR,REG	-
		E,NS,SR,REG	Distribution-connected UDC use*
Behind the meter (includes aggregations and renewables, vehicles)	Customer-sited, separate meters	E,NS,SR,REG	-
		E,NS,SR,REG	Customer Bill, PLS, DR / UDC use**
	Customer-sited, single meter (exporting in aggregate)	-	Customer Bill
		-	Customer Bill, PLS, DR / UDC use**
		E	Customer Bill, PLS, DR / UDC use**
		E,NS,SR	Customer Bill, PLS, DR / UDC use**
		E,NS,SR,REG	Customer Bill, PLS, DR / UDC use**
	Customer-sited, single meter (non-exporting in aggregate)	-	Customer Bill
		-	Customer Bill, PLS, DR / UDC use**
		E	Customer Bill, PLS, DR / UDC use**
E,NS,SR		Customer Bill, PLS, DR / UDC use**	
E,NS,SR,REG		Customer Bill, PLS, DR / UDC use**	

Configuration / Action Scoring

- Each action gets ranked for its expected impact
- The ranking is for each configuration / application
- Ranks are 1 (lowest) to 3 (highest)
- If the action is not applicable, it is listed as a hyphen
- Example:
 - Action: Establishing rules for resource owners to submit SQMD

-	Configurations that do not participate in the wholesale market, or perhaps for transmission-connected resources
1	Configurations that tend to be larger or monolithic, or those that are already able to submit SQMD
2	Configurations that may be aggregated
3	Configurations that must be aggregated

An example

Example: Standalone Energy Storage

Distribution	Substation Energy Storage	-	Distribution-connected UDC use*
		E,NS,SR,REG	-
		E,NS,SR,REG	Distribution-connected UDC use*
	Community Energy Storage	-	Distribution-connected UDC use*
		E,NS,SR,REG	-
		E,NS,SR,REG	Distribution-connected UDC use*
	Standalone Energy Storage	-	Distribution-connected UDC use*
		E,NS,SR,REG	-
		E,NS,SR,REG	Distribution-connected UDC use*
	Co-located with DG	-	Distribution-connected UDC use*
E,NS,SR,REG		-	
E,NS,SR,REG		Distribution-connected UDC use*	

Example: Financial Barriers

Financial Barriers									
Define and communicate grid needs			Clarify existing wholesale market product opportunities for storage		Refine existing and add new market products				
Clarify operational needs at transmission level	Clarify operational needs at distribution level	Facilitate clarification by IOUs of operational constraints	Clarify existing energy and AS market products in ISO markets	Clarify roles of storage in an evolving RA framework	Identify gaps/consider changes to existing wholesale market products	Clarify role of storage in deferring / eliminating transmission / distribution upgrades	Consider revising ISO's procedure for AS certification	Streamline rules for aggregations of distributed storage to participate in CAISO markets	Evaluate need/potential for development of distribution-level grid services
-	3	2	-	3	-	3	-	-	3
2	3	2	2	3	2	3	2	2	3
2	3	2	2	3	2	3	2	2	3

Example: Financial Barriers (Continued)

Financial Barriers							
Identify where rate treatment rules are lacking and clarify where existing rules may already resolve some issues			Define multiple uses of storage and develop needed rules	Define hybrid configuration		Assess existing and develop a preferred methodology to be used in procurement decisions	
Clarify rate treatment for charging mode	Clarify existing tariffs for BTM storage devices paired with NEM generators	Consider new proceeding for stand-alone BTM storage devices to address rates for charging and exporting power	Define and develop models and rules for multiple-use scenarios	Identify and develop clear models of use cases for hybrid energy storage sites	Clarify requirements and rules for participation	Prepare report / summary of efforts underway to develop publicly available models for assessment of energy storage	Consider refinements to evaluation methodologies used by IOUs to support CPUC decision on storage procurement
2	-	-	1	-	1	1	3
2	-	-	2	-	1	1	3
2	-	-	2	-	1	1	3

Example: Cost Reduction

Cost Reduction

Review duplicative metering requirements				Review telemetry requirements				Assess existing codes and identify gaps		Develop proposals for reducing cost of interconnection for small distribution-connected resources	
Establish value of / regulatory policy framework for shared ISO/UDC metering or meter data	Establish rules for resource owners to submit SQMD	Establish rules for UDC subtractive metering for BTM wholesale resources	Establish rules for certifying sub-metering and 3rd party meter data collection / VEE	Evaluate CAISO telemetry requirements for smaller resources	Evaluate KYZ, increasing 1-minute requirement, 10 MW limit	Evaluate value of common telemetry framework for California	Complete Expanding Metering and Telemetry Options Phase II	Review existing fire protection codes / identify best practices	Determine applicability and scope of UL and other certifications	Address certification process for integrated device metering	Address fees for interconnection of non-exporting resources
-	-	-	-	-	-	2	-	2	2	1	-
2	2	-	2	1	1	2	2	2	2	1	-
2	2	-	2	1	1	2	2	2	2	1	-

Example: Process and Timing

Process and Timing		
Clarify existing interconnection processes; provide better information; identify where more transparency is needed; and identify streamlining opportunities.		
Clarify existing interconnection processes	Coordinate between Rule 21 and WDAT to streamline queue management processes	Evaluate potential for a streamlined "faster track" interconnection process
3	2	2
3	2	2
3	2	2

Stakeholder participation continues to be crucial Early submission of comments help facilitate refining of Roadmap.

Date	Roadmap Milestone
September 18	Stakeholder comments received
October 2	Publish draft Roadmap
October 13	Stakeholder workshop #2
October 27	Stakeholder comments received
<i>November 3</i>	<i>Stakeholder call on draft matrix</i>
November 10	Comments on matrix requested
December	Publish final Roadmap

Thank you for your participation!

E-mail comments on the matrix to the energy storage mailbox: EnergyStorage@caiso.com

Find information at the Energy storage roadmap website: <http://www.caiso.com/informed/Pages/CleanGrid/EnergyStorageRoadmap.aspx>