

ONE-PAGE ELECTRICITY MARKET DESIGN SUMMARY

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Entities responsible for electricity market functions

Where the jurisdiction procures capacity separately from energy:

1. Capacity is procured through an auction.
2. The price is set by a central authority rather than an open market mechanism.
3. Retailers/large consumers are obliged to hold contracts or capacity certificates.
4. Retailers/consumers can engage directly with producers to meet capacity obligations.

Risk management mechanisms:

1. Standardised contract forms for bilateral contracting
2. Exchange traded futures
3. Financial transmission rights, settlement residue auctions and the like

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Centrally managed, financially &/or physically firm spot energy markets.

Non-energy services. Also known as as System Support Services or Essential System Services

Retail market characteristics:

1. Whether the market allows at some or all consumers a choice of electricity retailer.
2. Minimum demand required to qualify as a contestable customer.
3. Whether the market allows consumers/retailers a choice of meter equipment and/or data provider.
4. Approach to reconciling meter data and allocating unmetered consumption.

Scheduling and dispatch characteristics:

1. Gross pool: participants offer all generation capability, all generation quantities determined in central dispatch. Net pool: participants nominate self-scheduled quantities, deviation quantities determined in central dispatch.
2. Time granularity for which dispatched quantities are calculated
3. Extent to which facility commitment is managed by the participant vs instructed by the market operator
4. Extent to which market scheduling algorithms account for network and security constraints
5. How the market algorithms treat network losses
6. Dispatch compliance requirements on intermittent generation
7. Extent to which battery storage devices can provide market services

Governance		ELECTRICITY MARKET SUMMARY - NEW ZEALAND	
Policy	Ministry of Business, Innovation & Employment	Dispatch	Settlement
Regulation	Electricity Authority (market) Commerce Commission (monopolies)	Gross pool 1	Final prices 1
Market design lead	Electricity Authority	Net pool 2	Trading interval 2
Rule making	Electricity Authority	Dispatch interval 5 min 2	Energy price floor \$0/MWh
Scheduling & dispatch	Transpower	Dynamic loss factors 3	Energy price ceiling \$20,000/MWh
Power system operation	Transpower	Intermittent held to dispatch 4	Reserve price floor \$0/MWh
Market operation	NZ X (NZX, ASX, EFX)	Full participation of batteries 5	Reserve price ceiling None
Metering	Vector, AMS, IntelHub, SmartCo, + 9 other metering equipment providers	Interconnects 6	Scarcity pricing 3
Network planning	Transpower	Local pricing 5	Intervention pricing 4
TX owner	Transpower	System-wide pricing 6	
DX owner	Vector, PowerCo, Chon, Wellington Electricity, +25 other regional distributors	Ancillary services	
		Service Procurement Cost recovered from	
		Contingency Reserve Instantaneous Reserve 6s & 60s: co-optimised with energy Over frequency reserve: contracted	IR: generators >60MW pro-rated to injection, HVDC owner OFR: TX owner
		Regulation Single service: contracted then cleared ahead of energy	Loads pro-rated to offtake
		Inertia N/A	N/A
		Black start Contracted, availability fee + event fee	Grid owner
		Network support Voltage Support considered, but none currently contracted	Affected distributors in relevant zone per peak kVar
		Retail competition 1	Threshold 2
		Metering competition 3	Reconciliation approach 4
		Global settlement 4	

Settlement approach:

1. Ex-ante: prices firm at time of dispatch. Ex-post: prices determined after dispatch
2. Time granularity of settlement.
3. Whether market prices are explicitly adjusted during times of scarcity.
4. Whether market prices can be adjusted where the system operator or regulator has overridden market outcomes.
5. Locational granularity of prices.
6. Extent to which prices include the effects of network congestion.

Version number and release date

Physically connected neighbouring jurisdictions



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We can provide comprehensive reports on global electricity markets including market design and participation, upcoming policy and regulatory changes, and entry advice. We can also provide detailed price and dispatch forecasts for the market as a whole and for individual generators.

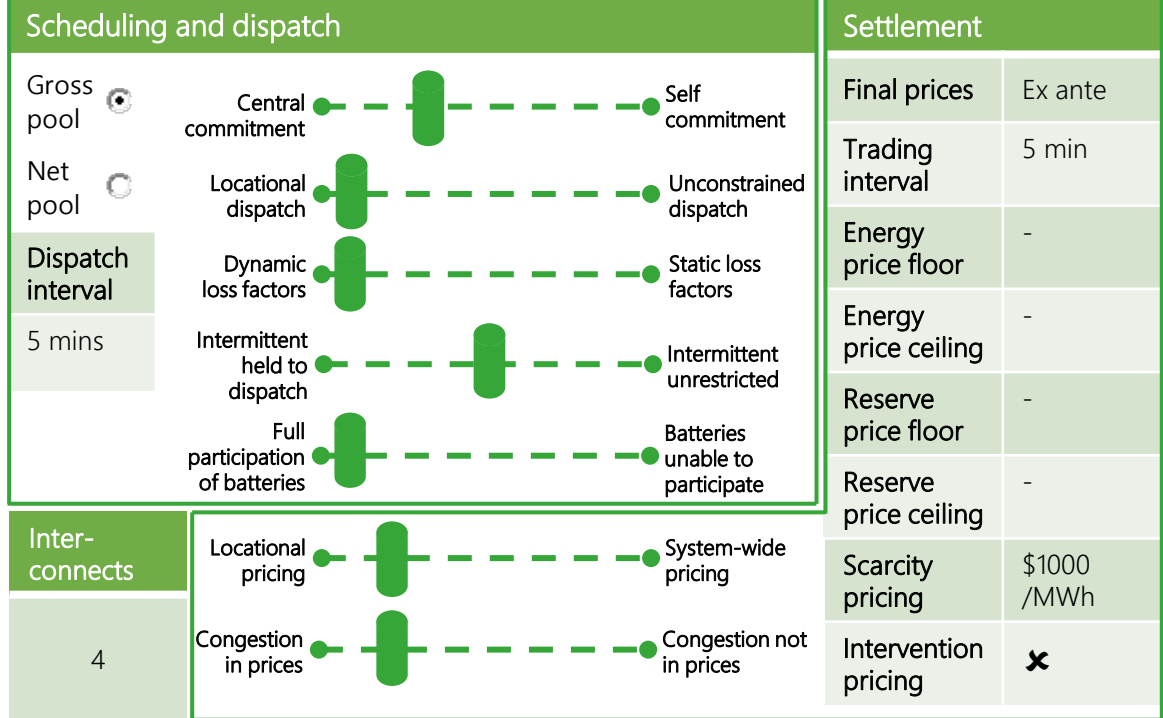
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Governance

Policy	California Energy Commission
Regulation	Federal Energy Regulatory Commission , California Public Utilities Commission
Market design lead	California Independent System Operator (CAISO)
Rule making	Federal Energy Regulatory Commission
Scheduling & dispatch	CAISO
Power system operation	CAISO
Market operation	CAISO
Metering	City of Anaheim , Pacific Gas and Electric and 10 others (distribution companies)
Network planning	CAISO
TX owner	Participating Transmission Owners: Pacific Gas and Electric , Trans Bay Cable LLC and 19 others (either tx only or tx/dx)
DX owner	City of Anaheim , Pacific Gas and Electric and 10 others

Capacity	Auction	✗	Contracts	OTC	✓
	Administered price	✗		ETFs	✓
	Retailer obligations	✓		Locational hedges	✓
	Bilateral agreements	✓	Spot	Day-ahead	✓
		Intra-day		✓	
		Real-time		✓	

ELECTRICITY MARKET SUMMARY – CALIFORNIA



Ancillary services

Service	Procurement	Cost recovered from
Contingency Reserve	Four services co-optimised with energy in day-ahead and real-time markets: spinning reserve, regulation up, regulation down and non-spinning reserve.	From market participants based on hourly charge for each type of reserve multiplied by hourly obligation
Regulation		
Inertia	No separate market	-
Black start	contracted or self-provided:	Transmission owners
Network support	CAISO shall select Units which have been certified for additional Voltage Support	From market participants in proportion to demand

Retail	Retail competition	✓	Threshold	Non-residential only totalling max 29K GWh pa	Metering competition	✗	Reconciliation approach	Global Settlement
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