



California ISO

Current GHG Accounting Approach

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Carbon Pricing in Wholesale Energy Markets

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How GHG is accounted for in ISO dispatch

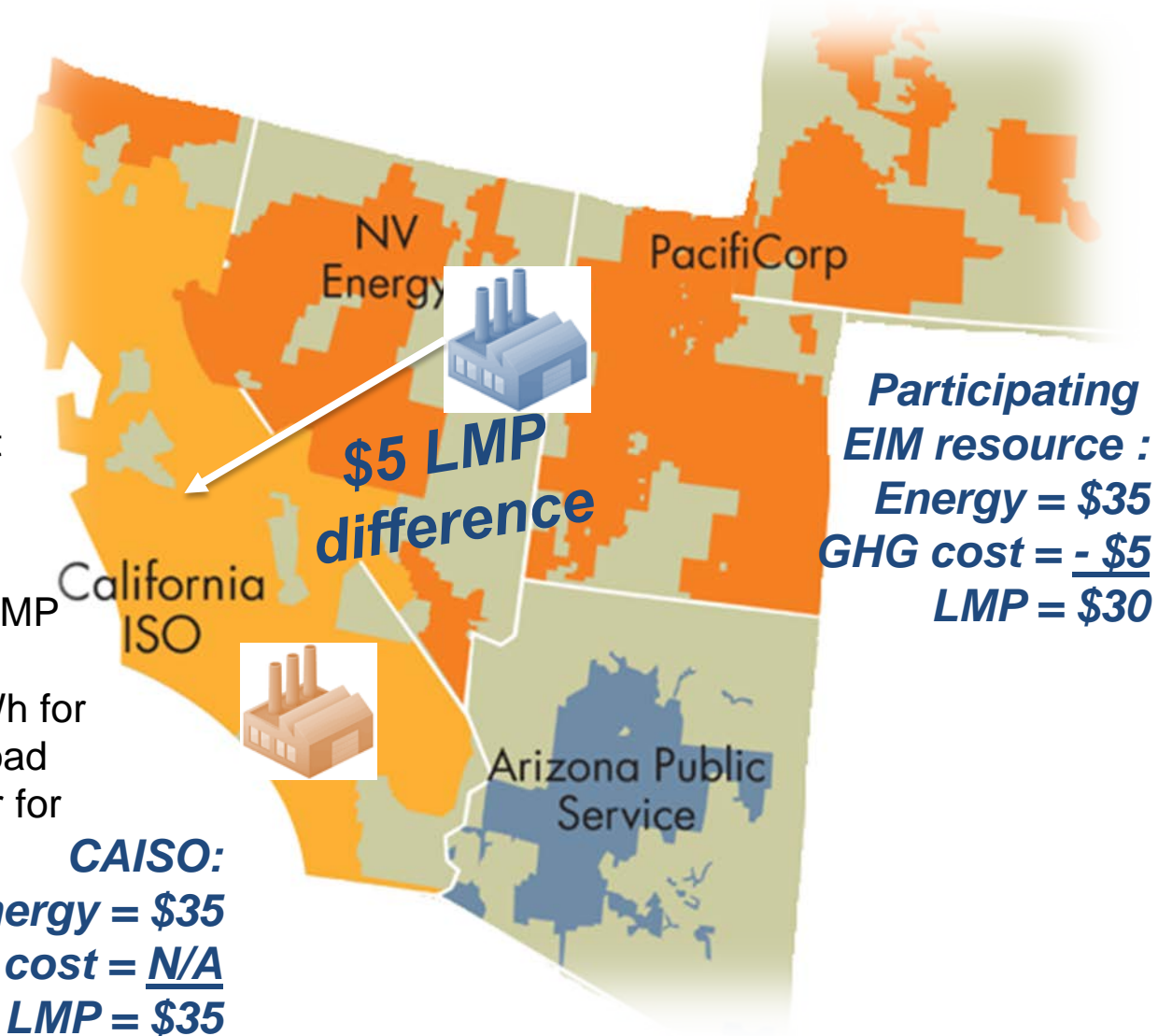
- Resources internal to CAISO have ability to incorporate GHG compliance costs into energy bid
- Imports into CAISO incorporate GHG compliance costs into their import bid
 - Specified Resources responsible for their specific emission rate
 - Unspecified resources responsible for GHG compliance based on default emission rate (.428 mTCO₂/MWh)
 - Asset Controlling Supplier (ACS) responsible for GHG compliance based on their areas average emission rate
- Energy Imbalance Market transfers: CAISO optimizes EIM participating resources contributing to CAISO load service based on resources GHG bid adder

How EIM accounts for California's GHG costs

- Both generators
 - Fuel cost = \$30/MWh
 - GHG cost = \$5/MWh
- CA generator
 - \$35/MWh energy bid
 - Sets \$35/MWh ISO LMP
 - Covers \$5/MWh GHG cost

- PacifiCorp generator
 - Imported to CA
 - Sets \$30/MWh EIM Area LMP
 - Sets \$5/MWh GHG price
 - ISO collects "extra" \$5/MWh for transfer to ISO from ISO load
 - Pays \$5/MWh to generator for its GHG costs

CAISO:
Energy = \$35
GHG cost = N/A
LMP = \$35

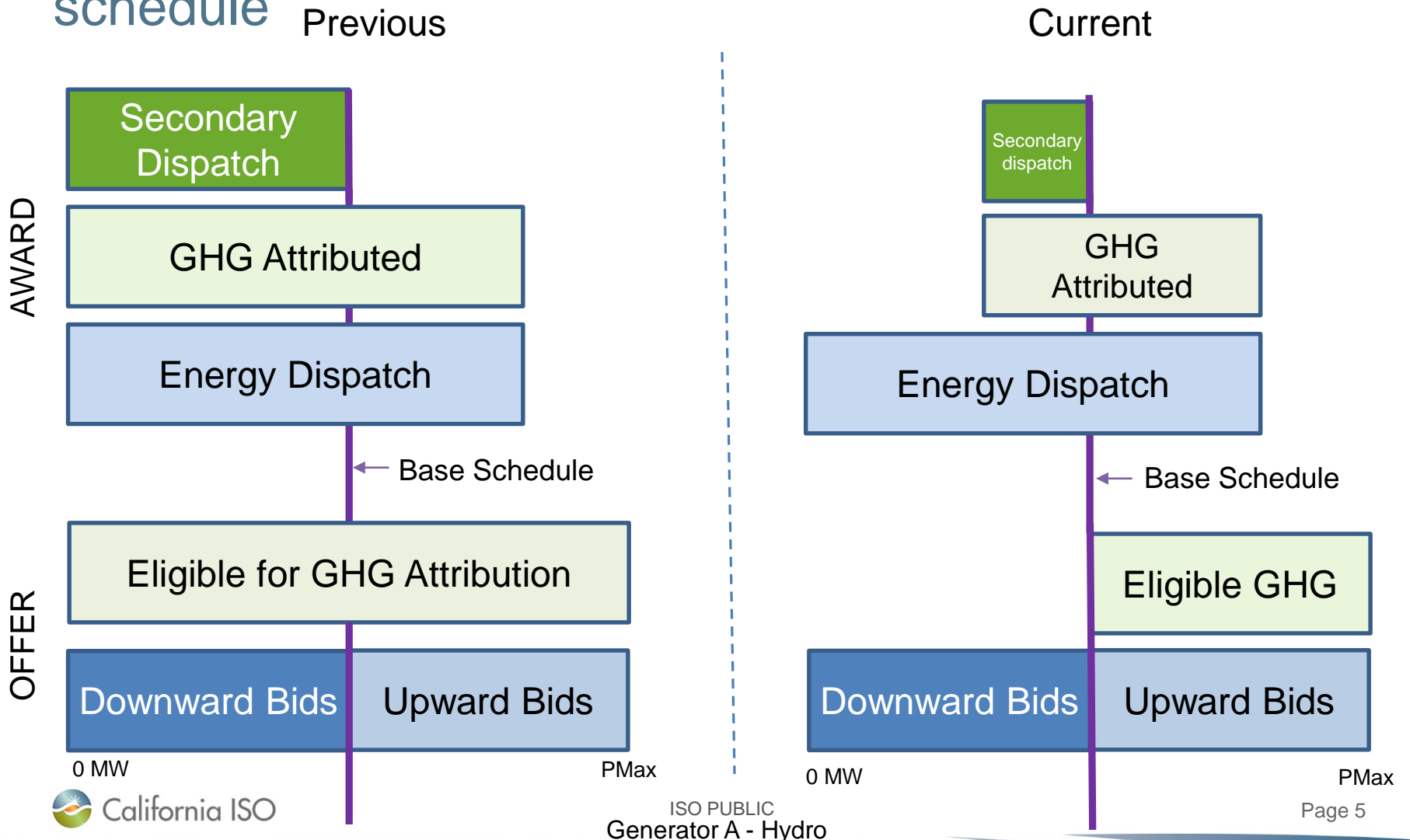


The GHG design has evolved since the start of EIM to improve attribution accuracy

	GHG Bid Quantity	GHG Bid Price
At outset of EIM	Pmax of resource	\leq \$1,000 less Energy bid
Year One Enhancement	0 MW to Pmax	\leq Resource daily GHG cost plus 10%
Minimize secondary dispatch	0 MW to (Upper economic limit less base schedule)	\leq Resource daily GHG cost plus 10%

Base schedule is the hourly resource plan to serve a non-CA BAA's load prior to start of the real-time market

Latest enhancement reduces magnitude of secondary dispatch by reducing potential attribution quantity to base schedule



Secondary dispatch may or may not cause under-accounting of full atmospheric effects

No change
in emissions

Backfill Energy
Dispatch

Generator C - Hydro

Emissions



Secondary Dispatch

Generator A - Hydro

Unaccounted
emissions

Backfill Energy
Dispatch

Generator B - Gas

Emissions



Secondary Dispatch

Generator A - Hydro

New initiative looking to allow EIM entities to participate in the day-ahead market

- Base schedules are zero in day-ahead
- Current EIM approach may not be scalable to the day-ahead market
- Potential designs must be consistent between the day-ahead market and real-time market