Current GHG Accounting Approaches

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How GHG is accounted for in ISO dispatch

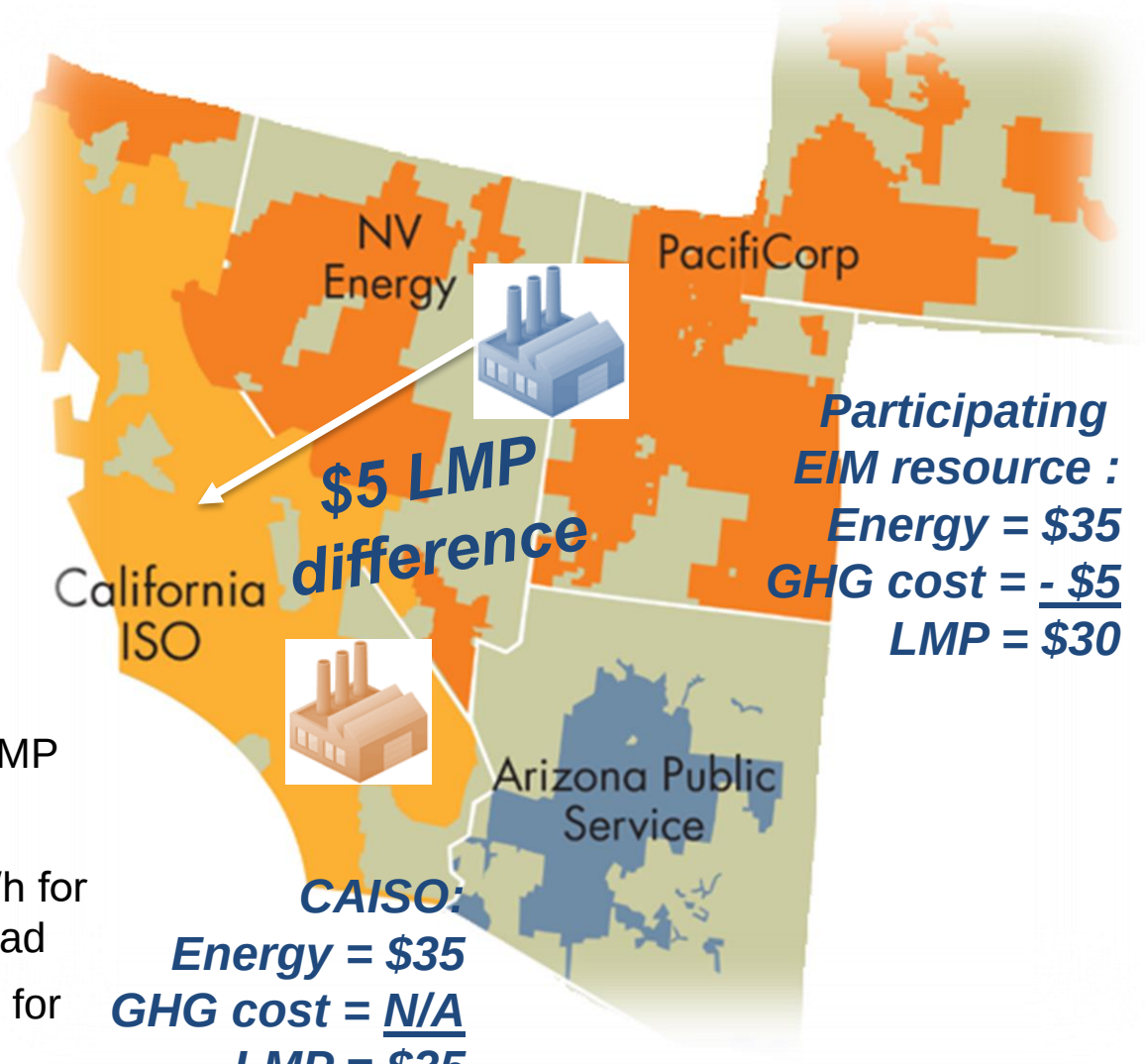
- Resources internal to California ISO have ability to incorporate GHG compliance costs into energy bid

- Imports into California ISO 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

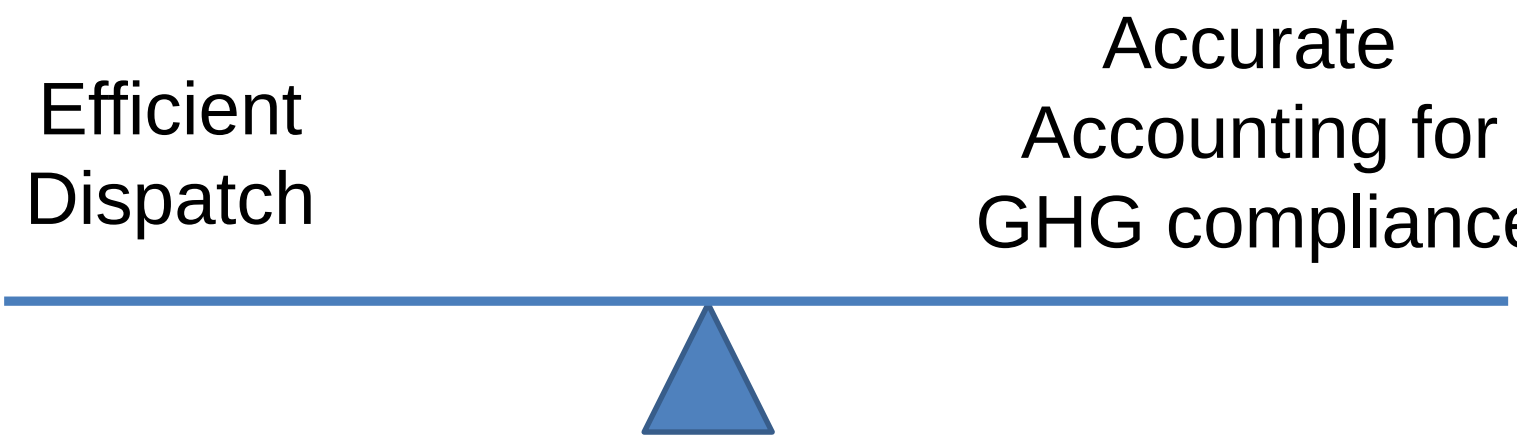
- Energy Imbalance Market transfers: CAISO optimizes EIM participating resources contributing to CAISO load service based on resources GHG bid adder

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



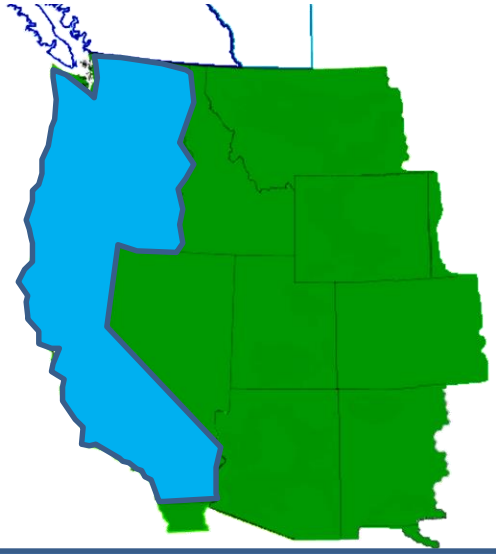
Accounting for GHG from external supply has competing objectives which must be balanced

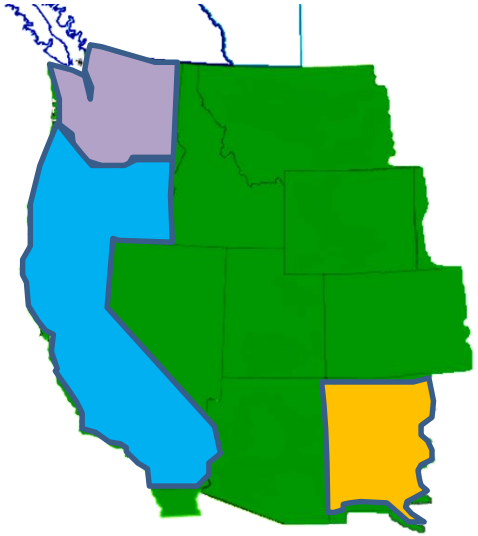


GHG policy effect on electricity market

- Cap-and-Trade (Allowances) vs Tax (Cost)
  - Cap-and-Trade: separates allowances from a GHG price, allowing suppliers to incorporate their costs into their bids
  - Tax: establishes a specific price per jurisdiction
- Point of Regulation
  - Energy suppliers: Allows suppliers to incorporate GHG costs into their supply bids for optimized use
  - End users: Requires knowing how end user energy needs being met. (contractual, self-supplied…)
- Interplay with Renewable Energy Credits
  - De-coupled: Allows for resource to be optimized considering GHG
  - Coupled: Limits ability to optimize supply to meet regional demand

Different GHG polices and benefits of linkable policies





Spectrum of Carbon Accounting vs Optimal Market Dispatch

Single Region

- Same allowance or GHG price applies
- Point of regulation on delivers
- No need to track imports/exports

GHG and Non GHG

- Same allowance or price in GHG region. No price in non-GHG region
- Common point of regulation resource within region
- Track imports or external source serving load within GHG region
- Supply in non-GHG region must provide a bid adder or GHG transfer rate reflecting GHG compliance cost of serving load in the GHG area

Multiple GHG Regions

- Different GHG prices by regions
- Point of regulation: various
- Different points of regulation, make tracking supply from area serving load in other GHG and non-GHG areas very difficult
- Assuming point of regulation is supply: Supply bids need multiple bid adder or have different GHG transfer rates applied to different the different GHG areas resource could serve load in.

GHG emissions to serve ISO load reduced 26% since 2014