Extended Day-Ahead Market Working Group 3: *Greenhouse Gas Accounting and Costs*

Facilitator: Kevin Head

Scribe: Brian Jacobsen

January 6, 2022

Meeting Cadence: Tuesdays and Thursdays, 1 – 3 p.m.

Agenda:

Time:	Topic:	Presenter:
9:00 – 9:05	Welcome/introductions	Kristina Osborne
9:05 – 10:10	Overview of some potential market optimization approaches	Kevin Head
10:10 – 10:50	Discuss list of objectives that can be used to assess potential approaches	Kevin Head
10:50 – 10:55	Recap of discussion	Brian Jacobsen
10:55 – 11:00	Upcoming topics	Kevin Head

Goals:

1) Provide a background of two potential market optimization approaches
2) Use these to develop a brief list of optimization market design objectives

Reminders:

- These collaborative working groups are intended to foster open dialogue and sharing of ideas and perspectives
- Please raise your hand if you have a question or comment at any time during the meeting and the facilitator will call on you
  - Please start by stating your name and affiliation
- Meetings are recorded and video files posted on corresponding working group webpages
- Stakeholders are welcome to present perspectives at these meetings
  - Please submit a request to present using the link located on the EDAM Resources slide at the end of this presentation

Market optimization considering GHG costs

- Wholesale electricity markets meet demand for electricity by matching it with least-cost generation
  - The market clearing process, typically referred as market optimization, uses mathematical methods to attain a least-cost solution through a security constrained unit commitment and economic dispatch
  - Costs are “bid in” (offered) into the market by scheduling coordinators
  - Markets that factor in all relevant costs arrive at the least-cost “efficient” dispatch because they minimize marginal costs
- There are two commonly discussed options for market optimization options for GHG costs
  - Resource-specific attribution
  - Unspecified attribution
- **Other options may exist and working group participants are encouraged to raise these in the coming weeks**

Resource-specific attribution

- Resource-specific attribution associates the costs of emissions with the generating resource when calculating a market solution
- By doing so, the costs of emitting and non-emitting resources can be co-optimized in such a way that the least-cost resources are dispatched to meet demand
- CAISO EIM currently uses a resource-specific attribution

This is not advocating to use this model, rather it is just an illustrative example of how this option could work

Resource-specific attribution – EIM example

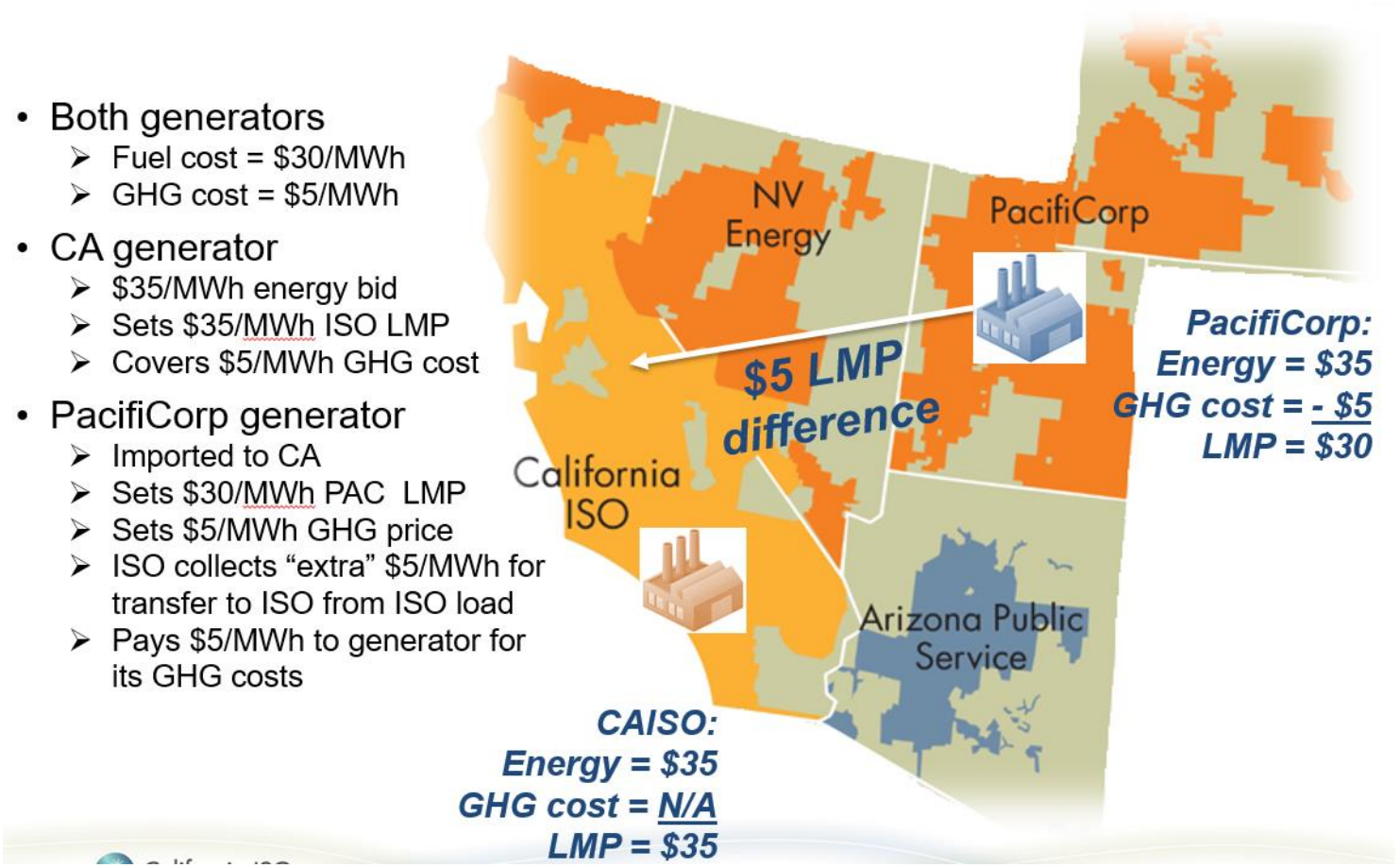
- CAISO's EIM market optimization recognizes that electricity generated and consumed outside of California does not create a compliance obligation under CARB's cap-and-trade program
- However, it does allow for the import of electricity into California if the EIM Participating Resource Scheduling Coordinator (SC) elects it to be and accepts the responsibility for holding GHG allowances for these imports
- On an hourly and resource-by-resource basis, the SC indicates whether it wishes for its resources' generation to serve CA load
- It does so by submitting a bid (separate from its energy bid) indicating the MW quantity of energy it wishes to deliver to California and the price at which it would be willing to deliver the energy

Resource-specific attribution – EIM example

- Once all bids have been submitted, the EIM's real-time market software will match the forecasted loads of California and the EIM area with the lowest-cost generation and GHG bids in both areas
- If optimal, EIM software uses an algorithm to "deem" imports to be delivered to California (limited by the resources' bid-in GHG MW and base schedule MW)
- Deemed imports create a compliance obligation and the EIM SC needs to procure and retire allowances for these imports
- E-Tag generated for EIM transfer is not resource-specific
  - There is no explicit e-Tag created between the generating resource in question and a load being served
  - Rather the e-Tag is represents the overall EIM transfer

Resource-specific attribution – EIM example

- 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 PAC 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



Unspecified approach

- An alternative approach to an resource-specific approach is to use an unspecified approach where the market optimization only solves for the transfers between GHG and non-GHG zones
- An emissions (hurdle) rate is applied to imports into GHG zones from non-GHG zones
  - Uses an exogenous $/MWh GHG cost input into the market
  - If the zone price difference is high enough to overcome the emissions hurdle rate, transfers will occur
- Transfers will create hurdle rate revenue at an “unspecified” rate

This is not advocating to use this model, rather it is just an illustrative example of how this option could work

Next steps and upcoming topics

- In the next meeting, we will address topics that are likely to universal to any potential market optimization options such as:
  - Identify GHG compliance area(s)
  - Eligibility to serve demand in the GHG compliance area(s)
  - What are we optimizing?
- This will allow working group participants to prepare to present materials for market optimization design proposals
  - Meetings 4 through 6 (1/13, 1/18, 1/20) will be the WG members' time to propose options and allow for other members to discuss and debate these proposals
  - If you wish to present a specific design proposal, please submit your idea here and provide any materials 5 business days beforehand

EDAM Resources

- List of *Common EDAM design principles and concepts*
- Initiative and working webpages:
  - EDAM initiative webpage: https://stakeholdercenter.caiso.com/StakeholderInitiatives/Extended-day-ahead-market
  - Working Group 3 webpage: https://stakeholdercenter.caiso.com/StakeholderInitiatives/Extended-Day-Ahead-Market-Working-Group-3-Greenhouse-Gas-Accounting-Costs
    - The working group webpages include meeting materials, initial scope items, and weekly summary reports
- Please submit EDAM WG inquiries and/or requests to present at https://www.surveymonkey.com/r/EDAMWG-Inquiries
  - Presentations due 5 business days prior to the meeting where they are scheduled to present, if time allows
- Register for working groups to help the ISO gage interest and facilitate communication throughout process.

- Nov 30, 2021 Day-Ahead Market Overview Training: https://youtu.be/lbXRsfdVbCg