March 7, 2022

EDAM working group #3 participants,

Below is a filled-out revised scope document for the proposed unspecified/zonal approach for GHG accounting in the Extended Day-Ahead Market (EDAM) using the scope document that was posted on February 18. This document was completed by the presenters of the unspecified/zonal approach (primarily, Mary Wiencke from Public Generating Pool and Jeff Spires from Powerex) that initially raised the unspecified/zonal approach in the working group. Thanks to Mary and Jeff for the hard efforts on this.

The purpose of this document is to serve as a reference document for the evaluation of the unspecified/zonal approach that we'll conduct during a future working group meeting. I expect that it will also be a useful resource when preparing the working group deliverables. There are still a few items marked as TBD which we'll endeavor to flesh out in the March 8 and 10 working group meetings as well. The details behind these "TBD" items can be found in a separate document on the working group webpage. Also, you'll see certain codes/IDs below (e.g. RA-2, UC-1). These are references to the homework assignment responses that are posted to the working group website here.

Best,

Kevin Head

EDAM working group #3 facilitator

Issue	Key Market Design Question	Homework assignment question ID	Detailed Market Design Question(s)
1) General Accounting			
Area Identify GHG Compliance Area(s)	Are entities aligned that state boundaries are the GHG compliance area?	A	Decide: What should the GHG compliance area be? Options include: Geographic In-state loads/resources + external resources if appropriate criteria are met. The criteria must be consistent with the relevant environmental program requirements. Topics: - Boundaries (UA-1) and potential need for alignment of transmission boundary concepts developed in Transmission working group. N/A as GHG zones (and associated transfers to the GHG zones) may be distinct from BAA transfers and physical transmission boundaries between states. However certain deliverability criteria may be applied to reflect state policies.

			- Implications for BAA spanning multiple states (RA-2, RA-3). - The GHG Regulation Area is a defined group of nodes that can partially overlap with a BAA, and defining GHG Regulation Areas can be done independently from BAAs. This will facilitate a BAA spanning multiple states and GHG Regulation Areas. - The starting assumption is that in-state loads and resources are assumed to be within the GHG zone; the market design will also provide external resources of entities that span state boundaries to be treated in a manner that is consistent with the established criteria set by program requirements. - Impacts to EIM Approach will replace current EIM approach - Rules that need to be established for renewable resource dispatch in/out of a GHG zone (UA-4) -
Availability Eligibility to serve demand in the GHG compliance area	What rules for availability need to be developed for EDAM for GHG?	B	Decide: What will availability to serve load in a GHG compliance area look like? Options include: - Approach allows for two pathways for resource-specific treatment in the GHG zone: 1) external resource is permanently or semi-permanently inside the GHG zone and dispatched as an internal resource; or 2) resource is dispatched on a resource-specific basis in shorter-duration intervals. - Both approaches must be consistent with state policy requirements Topics: - Determining availability - Supply resources election to make capacity available to support transfers to a GHG compliance area (RB-1, RB-2, UB-1) Supply resources have full discretion (within any applicable criteria limitation) on making energy or capacity available to GHG zone

Costs being optimized	Which costs should be included in the market optimization?		Are we optimizing:
			- Carbon prices? The cost of compliance is optimized based on bid submitted
			   o Quantity: MW
			   o Price: $/MWh
			   o Frequency: Hourly basis
			- RPS/CES? No
			Types

			- Carbon pricing (including how to consider GHG costs reflected in natural gas prices) Within the GHG zone, resources are dispatched with a GHG cost; in the non-GHG zone, resources are dispatched without a GHG cost. A hurdle rate is applied to transfers from the non-GHG zone to the GHG zone to prevent emissions leakage.
			- Clean energy/renewable There are two pathways (see above) for non-emitting or ACS energy that is physically external to the GHG zone to be delivered to the GHG zone at a resource-specific rate.
			Transactions covered
			- GHG zone:
			   o Generation w/in GHG zone
			   o Imports into GHG zone
			- Non-GHG zone:
			   o Generation w/in non-GHG zone
			   o Exports into GHG zone

Emissions attribution	How should GHG emission attribution be determined?		Decide: How should emissions be attributed? Options include: Solution does not require the market operator to make an attribution. - Resource specific - Unspecified
Participation options		A	Determining emissions attribution with different participation options (RA-4): N/A solution does not require attribution. - Imports at EDAM Boundaries - Pseudo-ties - Wheels though GHG compliance area - Virtual bids - Energy storage - Jointly-owned units - Self-scheduled resources (RA-1, UA-2, UA-3)

Multiple GHG Zones	Can the model accommodate multiple GHG zones? If so, how?	C	- From a technical perspective, can the model accommodate multiple GHG zones? (RC-2) Yes
			- If it can, how are the following impacted?
			   o Bidding between GHG zones (GHG zone A -> GHG zone B), linked versus unlinked
			   o Bidding from non-GHG zone to multiple GHG zones
			   o How market decides which GHG zone should be served
			- When there are multiple state GHG areas (e.g. WA and CA), how will the algorithm determine and prioritize which resources are deemed to which GHG area? (RC-1, UC-1)
			
			- The zonal concept supports multiple (separate) GHG zones

			- The zonal approach does not require the market algorithm to deem resources to one GHG zone or another. Instead, a participant with an external resource must confirm its intent to deliver to a certain GHG zone, and meet the applicable requirements to make that claim prior to be treated as resource-specific. - A hurdle rate will be applied to all other net imports into a GHG zone that do not meet the criteria for resource-specific treatment described above. - However, this could result in an unspecified hurdle rate being applied on resources that are imported from one GHG zone to another. To avoid this outcome, regions could choose to recognize programs in other areas, and waive/reduce the hurdle rate for unspecified deliveries between GHG jurisdictions. This will require further development work, in the future, to enable this feature.
2) Approach-specific Issues			

Baseline for evaluation of attribution (Resource-specific)	What should the baseline for evaluating GHG attribution?	D	- Under the EIM model today, GHG attribution quantity (MW) is limited by the upper economic limit minus the base schedule (note: not limited by WEIM incremental dispatch). Because there will be no base schedule in EDAM, what will the UEL be compared to determine GHG attribution? (RD-1)
			   o RUC D+1 results?
			   o 2nd IFM pass w/o transfers
			   o Other
			- If RUC D+1 results, what improvements or additional requirements are needed to improve the RUC D+1 results?
			   o Additional bidding requirements?
			   o Improvements to the RUC D+1 forecast?

Hurdle rate calculation (unspecified)	How would the hurdle rate calculation work?	E	- Will the hurdle rate be an exogenous input into the market? What are the components of this calculation? (UE-9, UE-11, UE-12) Hurdle rate will be exogenous. Default emissions factor x GHG cost = hurdle rate.
			- Will the hurdle rate be dynamic or static? (UE-2, UE-8). Initial assumption is the current default rate of 0.428 MT/MWh. However, should explore a more dynamic calculation to better reflect system conditions. For example, the hurdle rate could vary by hour of the day.
			   o If static, does this present gaming opportunities?
			   o No specific gaming opportunities have been identified.
			- Will the hurdle rate be responsive to the prevailing market rate of GHG allowances? (UE-2) Yes

			- Will the hurdle rate factor in the grid emissions intensity? If so, should it use an average emissions intensity or the marginal emissions intensity? How frequently would this be adjusted? Are out-of-zone clean resources that are "assigned to the zone" backed out of the unspecified rate (i.e. "the calculation of imports reflects that [the out-of-zone resources are] in the zone")? (UE-6) The emissions rate should be set as close as is reasonably possible to the likely marginal resource in the non-GHG zone - Can EDAM SCs negotiate their own specified emissions rate? Would self-scheduled power qualify for a resource specific emission rate? (UE-1, UE-4) ACS treatment may be approved by CARB; resource-specific treatment within the GHG zone must meet any applicable criteria
Alternate pathways to serve GHG zones (unspecified)	What alternative pathways would exist for a resource in a non-GHG zone to serve a GHG zone?	F	- What are the criteria for resources outside the zone to be included inside the zone? (UF-1, UF-3) Resources external to the GHG zone can be considered on an internal/specified basis if they are committed and/or available to serve load within the GHG zone. This criteria must be consistent with state policies and program requirements. - Can entities voluntarily opt-in? If so, how frequently can this election be made? (UF-2) Yes, if criteria are met
3) Secondary Dispatch and Other Consequences			
Leakage minimization	What mechanisms exist to limit leakage and secondary dispatch?	G	- How would secondary dispatch occur in the model and how it is designed to limit it? (RG-1, RG-2, UG-1, UG-2) Secondary dispatch is addressed by ensuring resource-specific treatment is limited to resources or surplus energy that is committed or available to serve load within the GHG zone and meets the applicable criteria for that claim. - Secondary dispatch is further addressed by applying an "unspecified" hurdle rate to imports that do not meet the criteria for resource-specific treatment. This is necessary to prevent inefficient dispatch, and potential increases in GHG emissions.

Other consequences of approach	Are there other unintended consequences of the model and how does the approach deal with these?	E, G	- Resource-specific approach
			  o Under the resource-specific approach, it is possible for resources to have been deemed to serve CA when it is impossible based on their transmission capabilities? If so, how does the approach deal with this?
			- Unspecified approach:
			  o It is possible that non-emitting resources might need to clear the hurdle rate that is meant to reflect GHG costs? (UE-10) The zonal approach supports non-emitting resources being delivered to the GHG zone and receiving resource-specific treatment provided that resource confirms intent to deliver and meets the applicable requirements.
			  o Would the proposal shift concerns about secondary dispatch from the day-ahead and real-time markets into the forwarding contracting horizon? (UG-2) No – CARB regulations already prohibit resource shuffling

				o In what specific way does this approach provide advantages to zero or low-emitting resources as compared to high-emitting resources outside GHG Regulation Areas? (UG-4) The zonal approach provides a path for low-emitting resources to be treated as resource-specific within the GHG zone. This allows low-emitting resources to receive the benefit of their clean characteristics. At the same time, a hurdle rate applied to unspecific imports prevents: a. external gas and coal being inefficiently dispatched instead of low-emitting resources b. a reduced price signal for external clean resources as a result of inaccurate GHG attribution

4) Reporting and Settlements

Reporting: Market Results	What type of information and at what granularity will GHG information be reported to support state reporting requirements?	H	- What process can be developed to ensure that LSEs and other market participants subject to GHG/RPS/CES regulations will receive data necessary to satisfy compliance obligations? What entity is responsible for reporting imported energy into a GHG zone? (RH-2, UH-1, UH-2, UH-4, UH-6, UH-7) Entities making elections for source-specific treatment in GHG zone will be responsible for reporting (consistent with bilateral market). CAISO will be responsible for providing data on unspecified imports from the non-GHG zone to the GHG zone. - Should we consider policy that is in effect/will be in effect by Jan 2024 or try to accommodate hypothetical reporting systems? Programs known to be implemented in this time frame should be considered; longer-term durability of approaches should be considered to accommodate states implementing existing statutory obligations. - What data needs to be tracked for compliance and harmonization with clean energy policy purposes (including other instruments that attribute generation to load)? It is not necessary for the EDAM solution to address this issue – states will determine tracking and accounting policies - How would energy be identified/tracked or tagged under a specified approach? (RH-3)
Settlements	How are GHG costs settled?	I	- Will entities bearing GHG compliance obligations be made whole for purchasing credits? If so, how? (RI-1) - In the unspecified approach, how will the hurdle rate revenue be distributed to the suppliers? (UI-1, UI-3) Hurdle rate revenue will be redistributed to load-serving entities within the GHG zone who will be responsible for reporting emissions, purchasing and retiring allowances; data will be obtained from CAISO.

5) Miscellaneous

Bidding of GHG costs	How will GHG costs be reflected to EDAM within, between, and outside a GHG zone?		Topics:
			- Should GHG costs be reflected in bids? If so, how?
			- GHG costs are reflected in the GHG zone based on the price and quantity offered:
			   ○ Quantity: MW
			   ○ Price: $/MWh
			   ○ Frequency: Hourly basis
			- How do cost reference level (DEBs and proxy costs) reflect GHG costs?
			   ○ Within GHG Regulation Area: Included based on prevailing GHG index price and the resource's specific characteristics (GHG emissions rate, heat rate, etc.).
			   ○ External area: N/A
			- Do they differ between DAM and RTM?
			- Intent is to align DA and RT approaches
			- How would this differ between WA and CA in terms of indices used?
			- TBD; indices could reflect applicable GHG zone(s).
			- And how are they used in market power mitigation?

Effects of EIM	What GHG bid and settlement implications arise from DA vs. RT deviation?	I, K	- Do we need to make updates to the RTM EIM GHG model to align it with EDAM? (UK-1) If not, what are the implication of this decision? (UK-2) Yes. - What allowable changes to either GHG quantity or bid price between DA and RT should be allowed? - What are the associated settlement impacts to any variation allowed? (UI-2)