Exploring a Potential Zonal Approach for EDAM GHG

March 1, 2022

Introduction

- The zonal approach to GHG costs in EDAM was developed in 2019-2020 by EIM Entities wanting to consider potential solutions for EDAM not based on the current approach in the EIM

- The intent at the time was to replace the current EIM framework and apply the zonal concept in EIM and EDAM

- When the EDAM stakeholder process was paused, the concept was put on hold and was not developed into a final proposal

- The concepts in this presentation are for discussion purposes only and do not reflect the positions of any one entity or group of entities

Policy Framework

- Energy generated in California or imported into the state is subject to California's greenhouse gas regulations; energy generated in Washington or imported into the state will be subject to Washington's greenhouse gas regulations beginning in 2023

- Washington and California programs are based on "first jurisdictional deliverer" (FJD) point of regulation – whoever first delivers energy into the state is the importer and has a compliance obligation

- Megawatt-hours and emissions associated with imports are reported and quantified (includes non-emitting imports)

- Importers with a compliance obligation must purchase and retire allowances – one allowance per ton of GHG

Policy Framework Applied to Bilateral Market & EIM

- In the bilateral market, energy is treated as unspecified unless imports are permitted or required to be claimed as the source of electricity delivered
  - Criteria apply to establish the source of electricity delivered such as a contract and/or an e-tag identifying a specific resource
  - Emissions rates for specified sources are resource specific and a default emissions rate is applied to unspecified imports
  - Asset controlling supplier imports are at an ACS rate which is a system annual average rate
  - The electricity importer is identified as the Purchase-Selling Entity (PSE) on the e-tag for the leg of transmission that crosses into California
  - Market participants have control over whether energy is imported and have the ability to price energy sales to incorporate the cost of purchasing allowances

- In the EIM, EIM participating resource scheduling coordinators are the electricity importer if their resource was dispatched to serve load within California
  - Based on EIM bid adders, CAISO attributes resources and quantities supporting EIM transfers to serve CAISO demand and compensates participating resources for their costs of compliance
  - All emissions rates are resource specific
  - Participating resources may specify quantities that are available to be attributed to CAISO demand but ultimately do not control when and how energy is attributed to CAISO demand

Why a Different Approach was Needed for EIM

- Bilateral market framework relies on bilateral transactions to identify electricity importers and quantify their emissions

- The EIM is a centralized market and there are no bilateral transactions – transfers between participating balancing authority areas represent energy potentially sourced across the market footprint therefore the PSE on the EIM e-tag is not necessarily the owner of the energy being imported

- Without bilateral transactions or source-specific tagging, there was not a pre-existing methodology to determine the source of the energy

- A new solution was needed to allow for a source-specific pathway for non- and low-emitting electricity imports, identify the electricity importer, and quantify emissions associated with energy imported to California via the EIM

Why EIM Entities Initially Sought a New Solution for EDAM

- Concern with solutions that require the market operator to assign specific resources to specific loads on a granular basis over all market intervals

- Concern regarding market participant lack of control over whether and in what quantity resources were 'deemed delivered' to CAISO leading market participants to uneconomically choose to flag resources as ineligible for delivery to CAISO
  - Where states raise double-counting concerns with non-emitting imports, compliance planning will be challenging if entities cannot plan for quantities deemed delivered

- In light of other jurisdictions adopting similar or modified cap-and-trade programs, there was a desire to seek a simpler solution that could more easily scale across multiple jurisdictions and multiple program types

- Concern that the EIM approach of attributing resources to CAISO demand is not accurate and therefore not optimal from an economic or environmental perspective

Key Objectives for EDAM Solution

- Quantify emissions associated with electricity imported to CAISO and Washington
- Ensure source-specific pathway for imports into CAISO and Washington
- Enable pricing and dispatch that reflect state pricing policies and application of GHG cost to electricity importers
- Minimize leakage
- Enable participants to control decision regarding electricity imports beyond flagging eligibility for deemed imports

Challenges with EIM Deeming Approach

- Deeming results in accuracy challenges
  - Deemed resource may not be the resource that increases its production to support the import to the GHG zone
  - Deemed resource may not be deliverable to the GHG zone

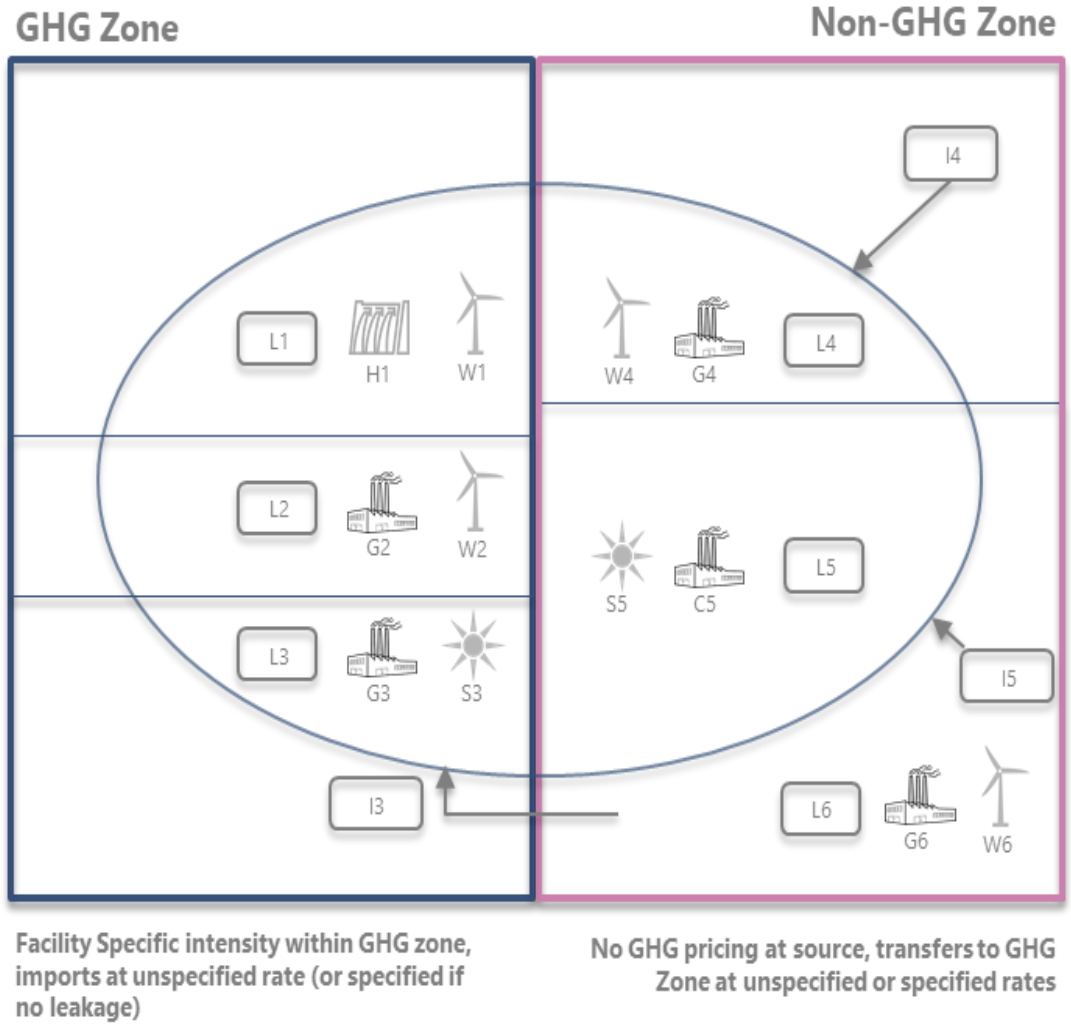
- Results in pricing and dispatches that are inconsistent with state policies and that reduce price signals for clean resources

- Does not adequately address leakage

- Deeming is determined by an algorithm and may conflict with the participant's intended use and control of its resources (including to meet load and/or clean energy objectives in other jurisdictions), leading to challenges in meeting requirements and/or double-counting concerns

Zonal Approach – Basic Concept

- Zones are made up of individual loads and resources, not based on balancing area or transmission topology
- Resources outside the GHG zone are dispatched without greenhouse gas cost
- Resources inside the GHG zone are dispatched with greenhouse gas cost
- As a starting point, the zones are defined based on loads and resources physically located in a jurisdiction that has adopted a GHG pricing policy



Enabling Source-Specific Pathway to GHG Zone

- A key challenge is addressing imports from the non-GHG zone into the GHG zone
- Assuming all imports are unspecified and/or emitting will potentially introduce discriminatory treatment of similarly situated resources
- Failing to enable source-specific pathway to the GHG zone:
  - Reduces efficacy of policy-driven changes in dispatch and investment signals
  - Potentially disincentivizes out-of-state development of non-emitting resources
  - Reduces accuracy of quantification of emissions associated with electricity imports
- The zonal approach must support non-discriminatory access for non-emitting and ACS resources to GHG zone

Possible Source-Specific Pathways to the GHG Zone

- Path 1: Define the GHG zone to include resources outside of physical state boundaries
  - Defined by criteria other than physical location that could mirror current criteria for establishing specified source treatment of imports
  - Likely a longer-term commitment for entities that are committed to meeting load within the zone
  - For purposes of optimization, would treat external resources *as if* they are physically located within state boundaries

- Path 2: Once the GHG zone is defined, some imports may be treated on specified- or entity-specific basis
  - Conceptually similar to current approach for specified-source imports in bilateral markets
  - Likely applicable to entities with surplus non-emitting supply in some periods and not others
    - e.g., ACS, hydro surplus, solar over-supply, IPPs, etc.

- Both approaches (or a combination) may be viable alternatives but will require additional discussion and consideration

Support for Source-Specific Treatment

- Source- or entity-specific treatment using either approach should require robust verification and validation

- More consideration of requirements would be necessary, but could include elements such as:

    1. Confirmation that the participant intends for the resource output to be imported to meet load into the GHG zone

    2. Demonstration that the resource is committed to and/or capable of serving load within the GHG zone

    3. Criteria to reasonably validate that clean energy is surplus

    4. Demonstration of meeting any other requirements of the applicable GHG program (e.g., meter data, specified source contract, etc.)

Addressing Leakage

- Regional market optimization will inherently seek to transfer the most economical energy across sub-regions within the market footprint

- Leakage is created when energy transfers occur between two areas in the region where one sub-region is including the cost of emissions while the other is not
  - This drives a shift from emitting generation in the GHG zone to potentially higher emitting generation in the non-GHG zone

- Another form of leakage is sometimes referred to as “secondary dispatch” where non-emitting resources are identified as being imported into the GHG zone while other emitting resources are increasing production (e.g., “backfilling”) to meet external load

Addressing Leakage Under a Zonal Approach

- The zonal approach should consider how these two different forms of leakage are addressed and seek to minimize the displacement of resources to a GHG pricing differential across sub-regions

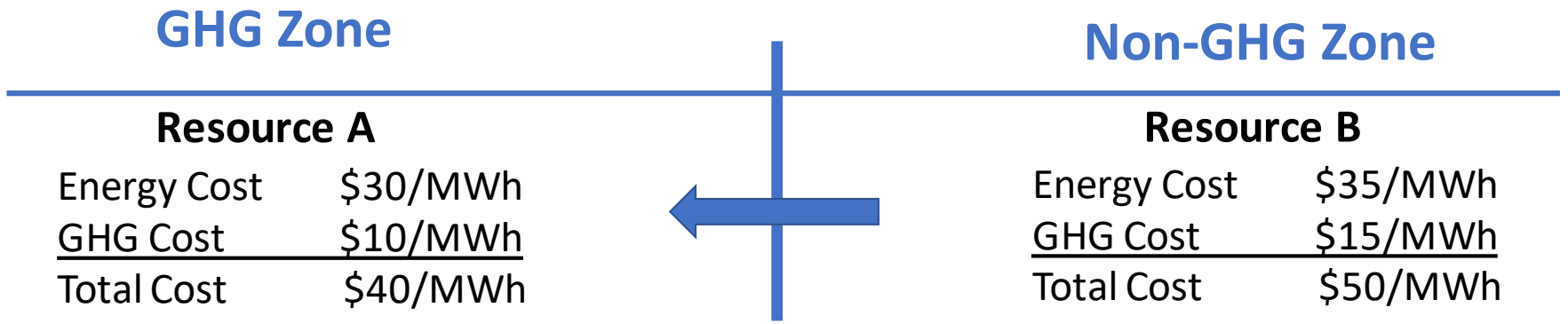
- First step to avoid leakage is to define appropriate criteria to allow resources to either (i) be included in the GHG zone, or (ii) be treated as "specified" import
  - e.g., explicit confirmation from participant that applicable criteria are met
  - Creates a starting point of resources that are committed to serving load within the GHG zone

Addressing Leakage Under a Zonal Approach

- All other imports that do not meet the criteria would face an "unspecified" hurdle rate to minimize inefficient dispatch and unaccounted for increases in GHG emissions associated with imports
  - The hurdle rate adds an assumed GHG cost (based on the estimated emissions intensity of an assumed marginal resource) to all imports into the zone that are not either (i) included in the GHG zone, or (ii) treated as resource-specific
  - While not preventing **all** leakage, an unspecified hurdle rate will greatly reduce the risk of an emitting resource outside the GHG zone inefficiently displacing a similar resource in the zone

- This mirrors approach currently in place in the bilateral market where a marginal emissions rate is applied to unspecified imports

Example for Unspecified Imports



- External Resource B is the higher cost resource
  - both with and without GHG emissions considered
- Without an import hurdle rate, External Resource B would appear less expensive and would be dispatched ahead of Internal Resource A
  - A similar outcome can occur under deeming approach
- An unspecified hurdle rate would prevent this outcome

Defining the Hurdle Rate

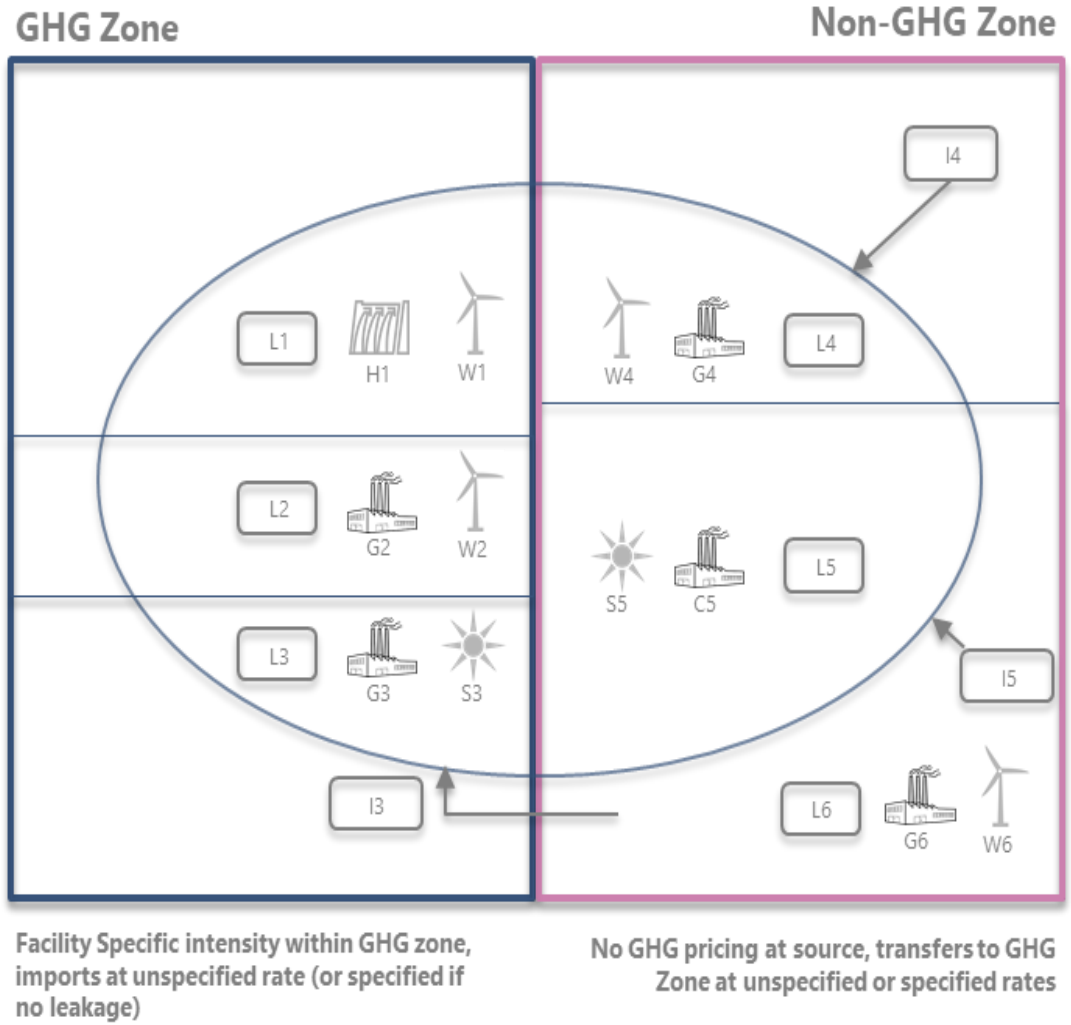
- The default emissions rate would be an exogenous and predetermined value for market optimization
  - Initial assumption is to use the current unspecified rate of 0.428 MT CO2/MWh across all market intervals
  - Consistent with current practice in the bilateral market, the unspecified rate is assumed to reflect the emissions of a marginal gas unit
  - The actual hurdle rate (in $/MWh) would depend on the assumed allowance price
    - e.g., $30/MT allowance price x 0.428 = $12.84 hurdle rate

- The unspecified emissions rate should be set based on a reasonable expectation of the marginal resource in the non-GHG zone
  - If the emissions rate is too high, more costly and higher emitting resources would be dispatched in the GHG zone
  - If the emissions rate is too low, leakage will occur as less efficient (and higher emitting resources) would be dispatched in the non-GHG zone

- Further consideration of whether a dynamic hurdle rate could better reflect system conditions
  - A dynamic rate could use an indicator of grid conditions to estimate most likely marginal resource
  - For example, hurdle rate could vary by hour of the day
  - Could be an improvement over a static assumption to further minimize leakage, while avoiding unnecessary hurdle rates (e.g., during hours of surplus renewable output)

Support for Program Linkage/Recognition

- The zonal concept supports multiple (separate) GHG zones
- But, if each GHG area applies an unspecified hurdle rate to imports, this could result in double-charging emitting resources that are being delivered from one GHG zone to another
  - GHG paid at the resource busbar, and again on import hurdle rate
- Regions could choose to recognize programs in other areas, and waive/reduce the hurdle rate for unspecified deliveries between GHG jurisdictions
  - Market design should support this concept as state policies develop



Compliance & Reporting

- Conceptually similar to the approach in the bilateral market
- Specified imports reported with validation requirements
  - Physically external resources treated as internal for optimization purposes may continue to be reported as imports
  - Will require adjustment or modification to current use of e-Tags and process for identifying the electricity importer
  - Validation requirements and identification of electricity importer for specified imports from the non-GHG zone will require further clarification and discussion
- Unspecified imports quantified based on default unspecified emissions factor
  - **Key Difference**: individual importers are not identified
  - Revenue is generated through the hurdle rate for purchase of allowances
  - Determination is needed regarding redistribution of revenue and assignment of responsibility for purchase and retirement of allowances

Options for GHG Hurdle Revenue

- Hurdle approach is revenue neutral
  - When GHG zone is a net importer, price separation between zones will reflect the unspecified rate
    - Generators in non-GHG zone will receive a (lower) price that does not reflect GHG costs
    - Load in the GHG zone will pay a (higher) price that reflects GHG costs
  - Market operator therefore collects surplus revenues, and the purpose of revenue redistribution is solely to ensure appropriate quantity of allowances retired

- Option 1: redistribution to load within GHG zone(s) on allocated basis
  - Could be allocated based on load ratio or amount of purchased energy
  - Existing precedent with respect to placing compliance obligation on load-serving entities through "EIM Purchaser" concept in current regulations

- Option 2: CAISO or other central entity purchases and retires allowances
  - Mechanically simple approach but identifying entity to perform this function may be challenging