Los Angeles Department of Water & Power

LADWP'S GHG ACCOUNTING PROPOSAL

JULY 26, 2022

Outline

- Introduction
- LADWP's Proposal
- Comparing Proposals and Considerations

Introduction

- LADWP developed this proposal in response to the ideas and issues discussed during the EDAM GHG working group meetings
- LADWP wanted to find a solution that will work with both Cap-and-Trade/Invest as well as Clean Energy Standard programs - we welcome feedback and ideas for further improvement
- We see the discussion following two paths:
  - For specified resources, there is an opportunity for improvement, and for the Resource Specific and Zonal approaches to coalesce
  - For unspecified energy, we offer an alternative proposal; it can't simply be a choice between the Resource Specific and Zonal approaches
- LADWP believes algorithmic deeming for unspecified market (EDAM/EIM) energy should be eliminated
- The solution should not further burden others outside of GHG zones
- LADWP's proposal focuses on the treatment of unspecified resources in a way that doesn't limit access to renewables
- Advocating for a change to Load Based Accounting for unspecified imports from EDAM/EIM into a GHG zone
- Ideally we end up with a solution that works for multiple zones with different GHG policies

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Load Based Accounting for Unspecified Imports

Bidding

Non-GHG Zone

Bid into GHG zone?

PRSC 1: Gas Unit ☐

PRSC 2: Gas Unit ☑

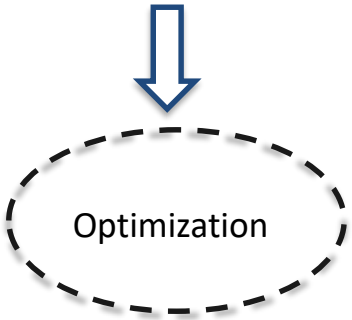
PRSC 3: Hydro Unit ☑

GHG Zone

Optimization

Market Operator

- MO now responsible for deriving GHG bid adder for resources bidding into GHG zone
- PRSC 1 Gas Unit – no bid adder
- PRSC 2 Gas Unit bid adder = PRSC 2 Gas Unit Master File emission factor x carbon cost
- PRSC 3 Hydro Unit bid adder = PRSC 3 Hydro Master File emission factor x carbon cost



Settlement

Non-GHG Zone

- ~~CC 491 credited to Generator~~
- ~~Generator purchases and retires allowances~~

GHG Zone

- GHG LSE buys at LMP
- CC 491 credited to GHG LSE

After the Fact GHG Accounting

Non-GHG Zone

- EIM Outstanding Emissions calculation is ***NOT*** applicable to the non-GHG zone
- The outstanding emission calculation only applies to Load in a GHG zone and is meant to capture secondary dispatch and emission leakage

GHG Zone:

- EIM Outstanding Emissions = Imported MWh x ~~Default~~ ATF Weighted Average Emission Factor – ~~Deemed delivered~~
- The weighted Average is derived from the individual Master File Emission Factor of each resource that was dispatched in a particular interval
- LSEs would report (MWh purchased from the market) x (weighted average GHG emission factor) and retire allowances to cover imported electricity. Since imported electricity is to serve native load, LSEs can use allocated allowances for compliance

Load Based Accounting is the Resource Specific approach with incremental reporting and after the fact accounting changes

Benefits of Load Based Accounting

- Benefits of the Load Based Accounting proposal for unspecified imports to a GHG zone:
  - Eliminates the need for algorithmic “deeming”, while leveraging Resource Specific approach.
  - Scheduling Coordinators for GHG emitting generating resources in non-GHG zone no longer have to submit GHG bid adders, forecast carbon costs, purchase GHG allowances, or report and verify GHG emissions to a regulatory agency within the GHG zone.
  - Avoids discriminatory treatment of like resources while keeping them aligned with GHG policy.
  - Doesn’t dictate GHG zone policy on market participants outside of the GHG zone.
- In terms of the Outstanding Emissions Calculation (already applicable to Load in a GHG area):
  - The weighted average GHG emission factor is derived from the actual dispatch of resources in the non-GHG zone, therefore there is no leakage or secondary dispatch concerns.
  - GHG emission accounting is more accurate than using a fixed default emission factor.

Deeming Issues

- Deeming is fundamentally flawed
  - Deemed delivered resources do not correspond with resources that actually increase their production.
  - Incorrect deeming leads to primarily renewable resources (lowest cost) receiving a GHG award ($$) without a need to purchase and retire allowances (no GHG compliance obligation) – the wrong resource is receiving a GHG payment!
- Irrespective of what resources are deemed delivered at the resource specific emission rate, emissions for EIM electricity imported into California are trued-up to the WECC-wide default emission factor through the outstanding emission calculation.
  - EIM Specified import = (100 MWh solar energy deemed delivered to California) x (GHG emission factor = 0) => GHG obligation = 0
- For Load Serving Entities (LSE) that don't want to receive energy from GHG emitting resources, opting out of the market does not avoid being assigned GHG emissions via the outstanding emissions calculation.
  - Outstanding emissions = (100 MWh energy deemed delivered to California) x (0.428 MT CO2e/MWh default GHG emission factor) => 42.8 metric tons GHG emissions assigned to Load, CARB withholds 43 GHG emission allowances from annual allocation to LSEs.
- Double counting between deemed delivered imported electricity (without e-tags) and ETSR e-tags (from a non-GHG zone into a GHG zone).
  - ETSR e-tags look like regular imports and exports

Calculating the Bid Adder

- A GHG bid adder for each emitting resource would be calculated by CAISO and used in the optimization
- Calculating the GHG bid adder:
  - GHG Emission Factors for each resource currently exist in the Master File
  - The Cost of Carbon could be based on the current price in the secondary market, or the Auction price (average of last 2 Auctions), or a price determined by the GHG regulatory agency(s)
  - The product of the resource-specific GHG Emission Factor and the Cost of Carbon would result in the GHG bid adder used for dispatch into the respective GHG zone
- Load Based Accounting would relieve a PRSC in a non-GHG zone of the administrative burden of GHG reporting and compliance with the regulatory agency in the GHG zone
- No change for PRSCs in a GHG zone; they would continue to be responsible for GHG emission reporting and compliance for their generating resources within the GHG zone

Capturing Actual Atmospheric Impact (Current)

LADWP proposal addresses the intent of the CARB EIM Outstanding Emission Calculation to capture leakage

- Currently CARB applies a default GHG emission factor to MWh imported to California through the EIM to calculate total GHG emissions, irrespective of what is deemed delivered to California by the Market Operator
- EIM Outstanding Emissions = (MWh of imported electricity "deemed delivered" to California as reported by the EIM Participating Resource Scheduling Coordinators multiplied by the default GHG emission factor for unspecified electricity and 2% default transmission loss factor) minus (Deemed Delivered EIM Emissions Reported by the EIM Participating Resource Scheduling Coordinators at the specified source emission rate):

  EIM Outstanding Emissions =(Imported MWh) x (**Default** Emission Factor) **–** (**CAISO Deemed delivered emissions)**

- The default GHG emission factor is a WECC wide proxy for marginal output based on 2010 data, that does not reflect the changing daily and hourly market conditions nor the increase in renewables forecast to be put into production over the next several years.

Capturing Actual Atmospheric Impact (Proposed)

LADWP is proposing that CAISO calculate (after-the-fact) the GHG emission rate (GHG/MWh) associated with each interval as a weighted average based on the actual dispatch of generating resources in the non-GHG zone.

This includes all resources dispatched, including secondary dispatch; therefore all GHG emissions should be accounted for and there should be no "Outstanding Emissions"

- More accurate approach to GHG emission accounting for imported electricity (actual atmospheric impact)
- Eliminates deeming
- Recognizes it is not possible in market optimization to associate specified generating resources with Load. All generation offered into the market is simultaneously dispatched to serve all Load and all exports subject to market constraints
- Energy imported into the GHG zone is assigned the weighted average GHG emission factor for GHG reporting and compliance purposes
- CAISO can hold the market dispatch information and provide the weighted average GHG emission factor on a monthly or annual basis

Total GHG Emissions = Imported MWh x Weighted Average Emission Factor – Deem elivered

Improved and more accurate calculation

Regulatory and Reporting Changes

- Changes will ultimately determined by regulatory agency within each GHG zone
- It is worth noting similar changes will be needed for Resource Specific approach
- California:
  - Load Based Accounting (LSE = EIM Purchaser) fits within CARB's definition of First Deliverer of Electricity
    - "First deliverer of electricity" or "first deliverer" means the owner or operator of an electricity generating facility in California, an electricity importer, or **an EIM Purchaser**
    - "Energy Imbalance Market Purchaser" or "EIM Purchaser" means, for a given data year an electrical distribution utility that directly or indirectly purchases any electricity through the EIM to serve California load… (see appendix for full definition)
  - Revise section 95111(h) of CARB's GHG emission reporting regulation
    - Transfer reporting and compliance responsibility from the EIM PRSC to the EIM Purchaser
    - *Modify EIM Outstanding Emissions calculation (no longer necessary if the market accounts for all GHG emissions including secondary dispatch)*
  - Revise definitions of Imported Electricity and Electricity Importer to focus on EIM/EDAM purchaser
  - EIM/EDAM Purchasers would report MWh of unspecified electricity purchased from the market (EIM, EDAM)
    - Add field in EPE reporting spreadsheet to report MWh purchased from the market and the associated GHG emissions
    - Change compliance obligation from pro-rata share of EIM Outstanding Emissions based on total retail sales, to actual MWh purchased from the market at the market weighted average GHG emission rate for each interval – phase II
- CAISO would provide
  - MWh purchased from the market by each LSE (EIM Purchaser)
  - Weighted average GHG emission rate associated with MWh purchased from the market

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LADWP Proposal - Before and After

	Before				LADWP Proposal		
	PRSC in Non-GHG Zone	PRSC in GHG Zone	Load in GHG Zone		PRSC in Non-GHG Zone	PRSC in GHG Zone	Load in GHG Zone
Impacted by Algorithmic Deeming	Yes	No	Yes		No	No Change	No
Need to Forecast Carbon Costs	Yes	Yes	Yes		No	No Change	No Change
Required to Purchase Allowances	Yes	Yes	Yes		No	No Change	No Change
Submit Bid Adder	Yes	No	No		No	No Change	No Change
Indicate Willingness to Bid in GHG Zone	Yes	No	N/A		No Change	No Change	No Change
GHG Settlement	Yes	Yes	Yes		No	No Change	No Change
GHG Reporting	Yes	Yes	Yes		No	No Change	No Change
Default Emission Factor Used	N/A	N/A	Yes		N/A	No Change	No
Emission Leakage	Yes	No	Yes		No	No Change	No
Secondary Dispatch	Yes	No	Yes		No	No Change	No

Comparing Proposals

	Unspecified				Source Specific Resource Bid into the Market		
	Resource Specific	Zonal	LADWP Proposal		Resource Specific	Zonal	LADWP Proposal
Who Determines Emission Factor?	Resource Specific	Calculated	Calculated		Resource Specific	Resource Specific	Calculated
Who sets the Carbon Cost?	PRSC	Agency	Reporting		PRSC	Marginal Cost	Reporting
Do PRSCs in non GHG have Reporting Obligations?	Yes	No	No		Yes	Yes	No
Is there Deeming?	Yes	No	No		Yes	Yes**	No
Is secondary dispatch fully accounted for?	Yes	No	Yes		Yes	Yes?	Yes
Is there still Leakage?	Yes	Yes	No		Yes	No?	No
Is there a cost shift?	Yes	Yes*	No		Yes	Yes^	No
Are changes needed to Agency policy & Reporting?	No	Yes	Yes		No	Yes	Yes
Is full Atmospheric Impact fully captured?	No	No	Yes		No	No	Yes
Is there a hurdle Rate?	No	Yes	No		No	Yes	No

** Market associates generation

* renewables can be excluded from dispatch increasing cost

^ marginal cost paid to all renewables

LADWP proposal is only one with no deeming

Considerations & Further Discussion

- Is there enough incentive for generators to move to non-GHG emitting resources or bid into a GHG zone?
  - Renewable resources that get incorrectly deemed are in-turn erroneously receiving a GHG payment
  - Without discriminating, should renewable resources receive a premium for selling zero-emission MWh?
  - The GHG bid adder is not paid in the bilateral market, is there a potential for a cost shift?

- How best to calculate the weighted average emission factor to capture the full atmospheric impact
  - Only what was dispatched by the market during that interval?
  - Or market-wide footprint regardless of optimization?

- How is the cost of carbon is calculated we would defer to the respective regulatory agency
  - Variety of ways this can be established
  - Using a single Carbon cost across the market would streamline settlement and aid linkage of GHG zones

Appendix

EIM Worst Case GHG Scenario:

- GHG constraint binds in Real Time Dispatch (RTD), and California (CA) is importing 15 MWh
  - Non-GHG BAA 1's Dynamic ETSRs are at 0 MW, but a Hydro resource from that EIM BA is "deemed" to deliver 10 MWh
  - Non-GHG BAA 2 has an emitting resource deemed to deliver the remaining 5 MWh, and sets the marginal GHG component at $30/MWh
  - CA LSE had a renewable resource outside of CA that could generate the 10 MWh, but was not eligible for a GHG award as it is seen as being "in" CA
- Non-GHG BAA 1 receives CC 491 credit at 10 MWh * marginal price = $300
  - Incurs 0 MTCO2e obligation, and no GHG allowance is procured or surrendered
- Non-GHG BAA 2 receives CC 491 credit at 5 MWh * marginal price = $150
  - Incurs MTCO2e obligation @Emission Factor = 1.0 and pays for the allowance at ICE price of $30/MTCO2e = $150
- CA LSE funds the CC 491 payments to Non-GHG BAA 1 and 2 through elevated RTD LMP. Total CC 491 Payment: $450
  - Prorated to CA retail customers
- The after the fact EIM Outstanding Emissions calculation is 15 MWh * 0.428 default emission factor less 5 MTCO2e Non-GHG BAA 2's obligation
- CA LSE future allocated allowances are reduced by the 1.42 MTCO2e outstanding emissions (ICE value $42.6)
  - Prorated to CA retail providers
- CA LSE ~pays almost $500 for obligation covered by a $150 allowance

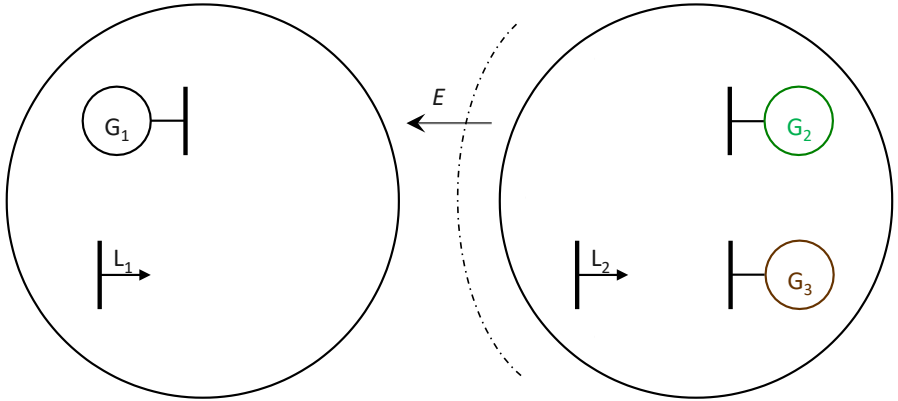
Appendix (continued)

- CARB Definitions
  - "Energy Imbalance Market Purchaser" or "EIM Purchaser" means, for a given data year **an electrical distribution utility that directly or indirectly purchases any electricity through the EIM to serve California load** in the data year, and receives allowance allocation in the subsequent year pursuant to section 95892 of the Cap-and-Trade Regulation. An electrical distribution utility is considered to have purchased electricity through the EIM in a given data year if, during any 5-minute interval in the data year, the electrical distribution utility serves California load through imbalance energy purchased directly from the CAISO market. An electrical distribution utility is considered to have purchased electricity through the EIM in a given data year if, during any 5-minute interval in the data year, the electrical distribution utility participates in CAISO markets indirectly through a CAISO scheduling coordinator that meets any part of the electrical distribution utility's California load with imbalance energy.
  - "Electricity importers" deliver imported electricity. For electricity that is scheduled with a NERC e-Tag to a final point of delivery inside the State of California, the electricity importer is identified on the NERC e-Tag as the purchasing-selling entity (PSE) on the last segment of the tag's physical path with the point of receipt located outside the State of California and the point of delivery located inside the State of California. For facilities physically located outside the State of California with the first point of interconnection to a California balancing authority's transmission and distribution system when the electricity is not scheduled on a NERC e-Tag, the importer is the facility operator or scheduling coordinator. Federal and state agencies are subject to the regulatory authority of ARB under this article and include Western Area Power Administration (WAPA), Bonneville Power Administration (BPA), and California Department of Water Resources (DWR). **For electricity that is imported into California through the CAISO Energy Imbalance Market, the electricity importer is identified as the EIM Participating Resource Scheduling Coordinators and EIM Purchasers serving the EIM market whose transactions result in electricity imports into California.**
  - "Electricity exporter" means electric power entities that deliver exported electricity. The entity that exports electricity is identified on the NERC e-Tag as the purchasing-selling entity (PSE) on the last segment of the tag's physical path, with the point of receipt located inside the State of California and the point of delivery located outside the State of California. **Electricity exporters include Energy Imbalance Market (EIM) Entity Scheduling Coordinators serving the EIM market that can result in exports from California.**

Appendix (continued)

- CARB Definitions
  - "Imported electricity" means electricity generated outside the State of California and delivered to serve load located inside the State of California. Imported electricity includes electricity delivered across balancing authority areas from a first point of receipt located outside the State of California, to the first point of delivery located inside the State of California, having a final point of delivery in California. Imported electricity includes electricity imported into California over a multi-jurisdictional retail provider's transmission and distribution system, or electricity imported into the State of California from a facility or unit physically located outside the State of California with the first point of interconnection to a California balancing authority's transmission and distribution system. Imported electricity includes electricity that is a result of cogeneration located outside the State of California. Imported electricity does not include electricity wheeled through California, defined pursuant to this section. Imported electricity does not include electricity imported into the California Independent System Operator (CAISO) balancing authority area to serve retail customers that are located within the CAISO balancing authority area, but outside the State of California. Imported Electricity does not include electricity imported into California by an Independent System Operator to obtain or provide emergency assistance under applicable emergency preparedness and operations reliability standards of the North American Electric Reliability Corporation or Western Electricity Coordinating Council. **Imported electricity shall include Energy Imbalance Market (EIM) dispatches designated by the CAISO's optimization model and reported by the CAISO to EIM Participating Resource Scheduling Coordinators as electricity imported to serve retail customers load that are located within the State of California.**

Example



- One generator and a load are in the ISO, and two generators and a load are in the EIM Entity BAA, as shown in the figure below
- The power transfer (*E*) between the BAAs is limited to 100 MW
- The optimal dispatch and export allocation are as follows:

Resource	Dispatch (MW)	Export Allocation (MW)	LMP ($/MWh)
G1	100	-	50
G2	100	100	30
G3	50	0	30
L1	200	-	50
L2	50	-	30

The resource data is as follows:

Load	Forecast (MW)
L_1	200
L_2	50

Generator	Minimum (MW)	Maximum (MW)	Energy Bid ($/MWh)	GHG Compliance Bid Adder ($/MWh)
G_1	0	300	50	-
G_2	0	200	35	0
G_3	0	200	30	6

Example (continued)

Resource Specific

The marginal congestion cost of $15/MWh and the marginal GHG compliance cost of $5/MWh on a 100 MWh energy export result in a congestion revenue of $1,500 and an GHG compliance revenue of $500, respectively. Assuming that the GHG compliance revenue is distributed to the optimal export allocations, the settlement is as follows:

Resource	Energy Cost	GHG Compliance Cost	Total Cost	Energy Payment	GHG Compliance Payment	Total Payment
G_1	$5,000	-	$5,000	$5,000	-	$5,000
G_2	$3,500	$0	$3,500	$3,000	$500	$3,500
G_3	$1,500	$0	$1,500	$1,500	$0	$1,500
L_1				–$10,000		
L_2				–$1,500		
Congestion Revenue				$1,500		
GHG Compliance Revenue				$500		

where it is assumed that GHG compliance costs for G1 are included in the energy bid (cost) and recovered through the energy payment, and as such they are not shown explicitly. It can be seen in the settlement results above that the total payment to each generator is sufficient to cover the respective energy and GHG compliance costs.

LADWP Proposal

Resource	Energy Cost	GHG Compliance Cost	Total Cost	Energy Payment	GHG Compliance Payment	Total Payment
G_1	$5,000	-	$5,000	$5,000	-	$5,000
G_2	$3,000	$0	$3,000	$3,000	$0	$3,000
G_3	$1,500	$0	$1,500	$1,500	$0	$1,500
L_1				–$10,000	$500	-$9,500
L_2				–$1,500		-$1,500
Congestion Revenue				$1,500		$1,500
GHG Compliance Revenue				$500		