California ISO

GHG Coordination Working Group

January 21, 2025

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- If you are connected to audio through your computer, open the participant and chat panels on the bottom right.
- If you dialed in to the meeting, press *3 to raise your hand. 
- Please remember to state your name and affiliation before making your comment.
- You may also send your question via chat to all panelists.

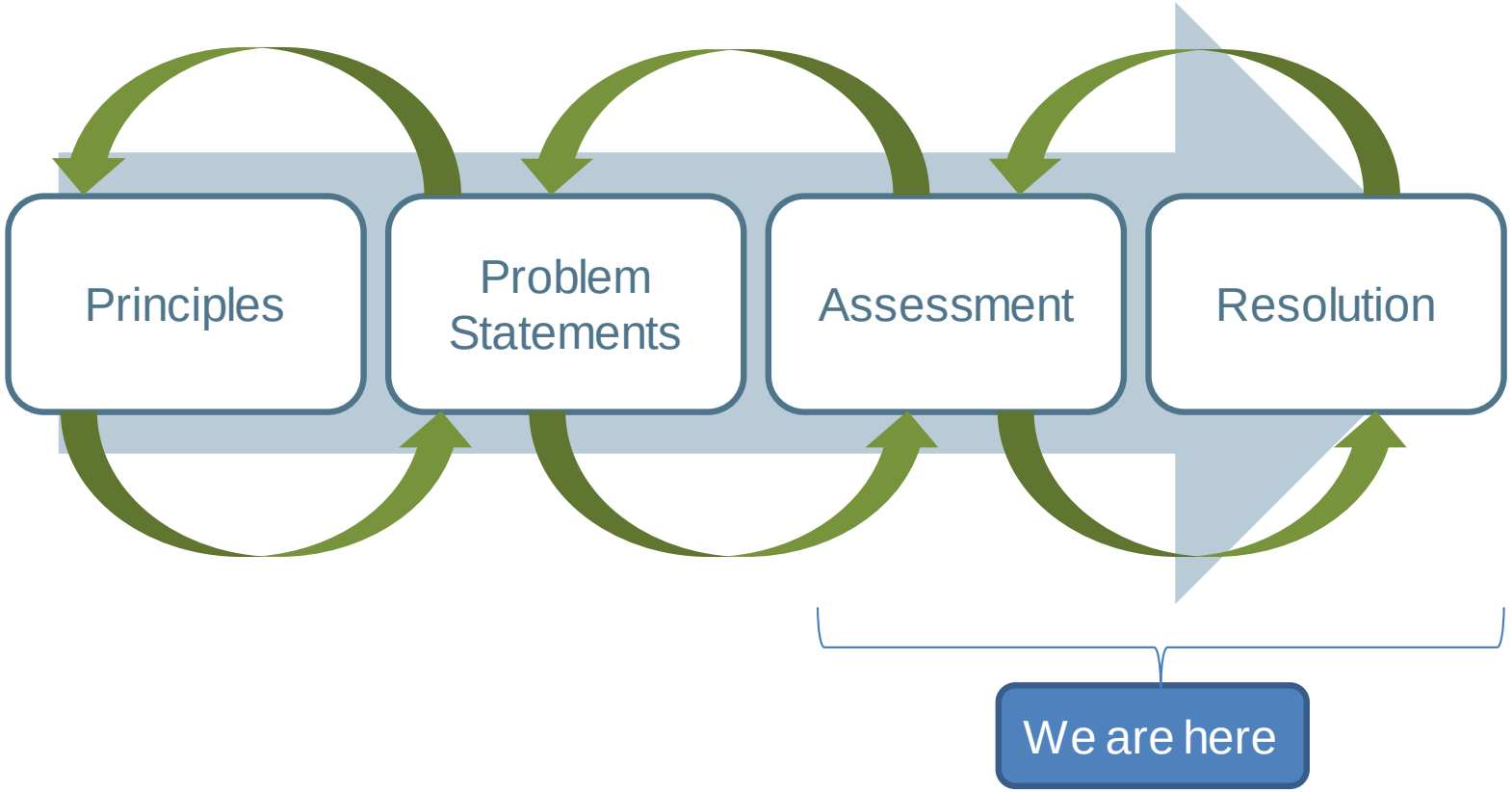
Notice to Participants

***Please be reminded**, Commissioners and advisors from state public utility commissions may be in attendance.*

Agenda

Time	Topic	Speaker
1:00 – 1:05	Welcome & Introductions	Isabella Nicosia
1:05 – 2:20	Counterfactual Examples	George Angelidis
2:20 – 2:30	Break	
2:30 – 3:45	Accounting and Reporting Approach	Anja Gilbert
3:45 – 4:00	Next steps	Isabella Nicosia

Working group progress to date



California ISO

Greenhouse Gas Counterfactual

George Angelidis, Ph.D.
Executive Principal
Power Systems and Market Technology

Greenhouse Gas Coordination Working Group
January 21, 2025

Greenhouse gas counterfactual purpose

- Reduce secondary dispatch due to GHG attributions in the IFM by limiting them to resource capacity not scheduled in the GHG counter-factual pass
  - GHG attributions optimally attribute resource schedules to net import into GHG regulation areas
  - Secondary dispatch is the phenomenon where higher emitting resources outside GHG regulation areas backfill for GHG attributions of lower emitting resources to serve non-GHG regulation area demand, thereby increasing the atmospheric cost of emissions that is not captured in the market solution

Greenhouse gas counterfactual alternative methods

- No GHG Cost
  - Like IFM, but without GHG bids and GHG cost in energy bids
  - Optimal net import into GHG regulation areas
  - Optimal BAA transfers

- CAISO method (filed with and approved by FERC)
  - Like IFM, but without GHG bids
  - No net import into GHG regulation areas
  - Optimal BAA transfers

- Vistra et. al
  - Like IFM, but without GHG bids
  - No net import into GHG regulation areas
  - No BAA transfers

Greenhouse gas counterfactual: CAISO method

- Answers the question: what would have been the optimal solution if GHG regulation areas were not in the market footprint?
  - No GHG bids, thus no GHG attributions and no net import into GHG regulation areas
  - Optimal BAA transfers like in the IFM

Greenhouse gas counterfactual: Vistra method

- Answers the question: what would have been the optimal solution if GHG regulation areas were not in the market footprint and there were no transfers between BAAs?
  - No GHG bids, thus no GHG attributions and no net import into GHG regulation areas
  - No BAA transfers; BAA supply meets BAA demand

Greenhouse gas counterfactual: No GHG Cost method

- Answers the question: what would have been the optimal solution if there were not any GHG cost in the market footprint?
  - No GHG cost in energy bids, no GHG bids, no GHG attributions
  - Optimal net import into GHG regulation areas
    - Used as reference for GHG attributions in IFM
  - Optimal BAA transfers like in IFM

Greenhouse gas market model and settlement

- GHG counter-factual schedules are used as reference for GHG attributions in IFM
  - GHG attributions have specific GHG bids
  - GHG attribution is limited to (UEL – GHG Reference)
- Net import into a GHG regulation area is allocated to GHG attributions for that area
  - The shadow price of the allocation constraint is the marginal GHG cost for the respective GHG regulation area
  - GHG attributions are paid the respective marginal GHG cost

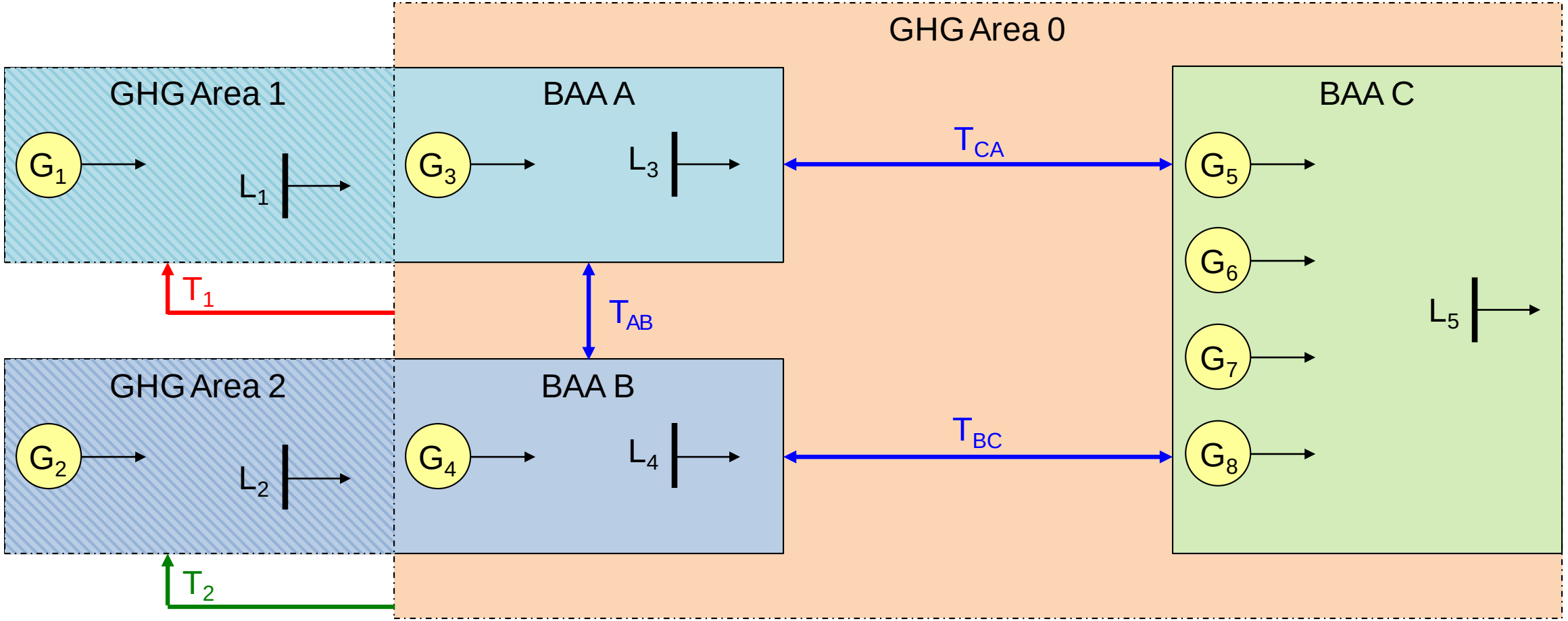
Additional details for the No GHG Cost counterfactual method

- Net import into a GHG regulation area above the counterfactual reference is allocated to GHG attributions for that area
- The counterfactual import reference has no resource-specific GHG attributions and no GHG cost in the market
  - *It can be priced ex post at the product of the average emission cost of external counterfactual resource schedules and the relevant carbon cost, and charged to the GHG regulation area load*
  - *The overcollection from the difference between the GHG revenue for the import reference at the marginal GHG cost and the average GHG cost (if any) is returned to the GHG regulation area load*

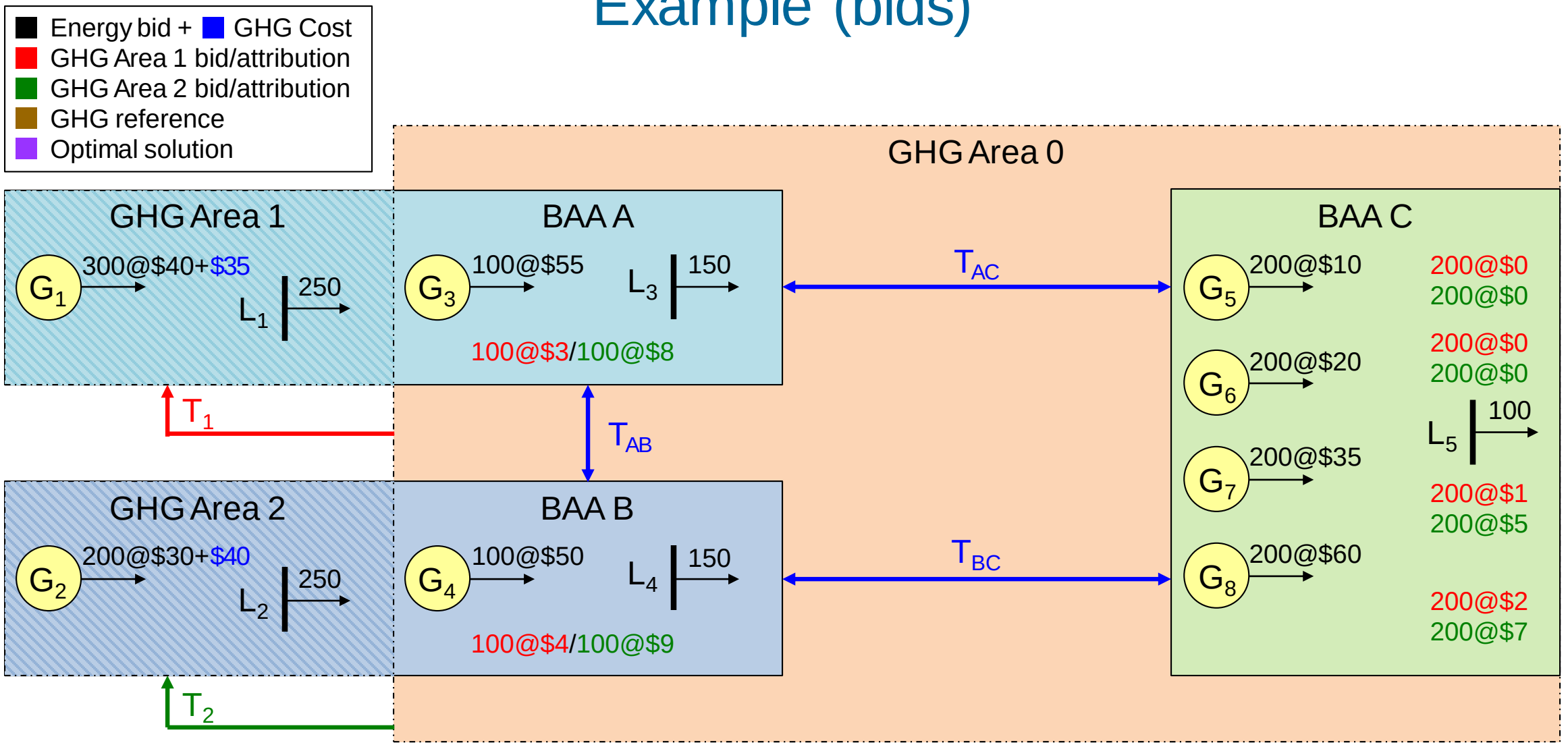
Greenhouse gas counter-factual comparison

Effect	CAISO Method	Vistra Method	No GHG Cost Method
Overall IFM cost (objective function)	Baseline for comparison	Lower because it allows higher GHG attribution volume	Lowest because the import reference is priced ex post at the average emission cost
Secondary dispatch	Baseline for comparison	Higher because it allows higher GHG attribution volume	Lower because it results in lower GHG attribution volume
Settlement for GHG cost	GHG attribution payment at the marginal GHG cost	GHG attribution payment at the marginal GHG cost	GHG attribution payment at the marginal GHG cost and (optionally) import reference average GHG charge to GHG load
Settlement impact to GHG regulation area load	Baseline for comparison	Lower because it reserves more capacity for GHG attributions	Lowest because import reference is not priced on the margin
Settlement impact to load outside of GHG regulation areas	Baseline for comparison	Higher because it reserves more capacity for GHG attributions	Lowest because capacity is attributed only above the import reference

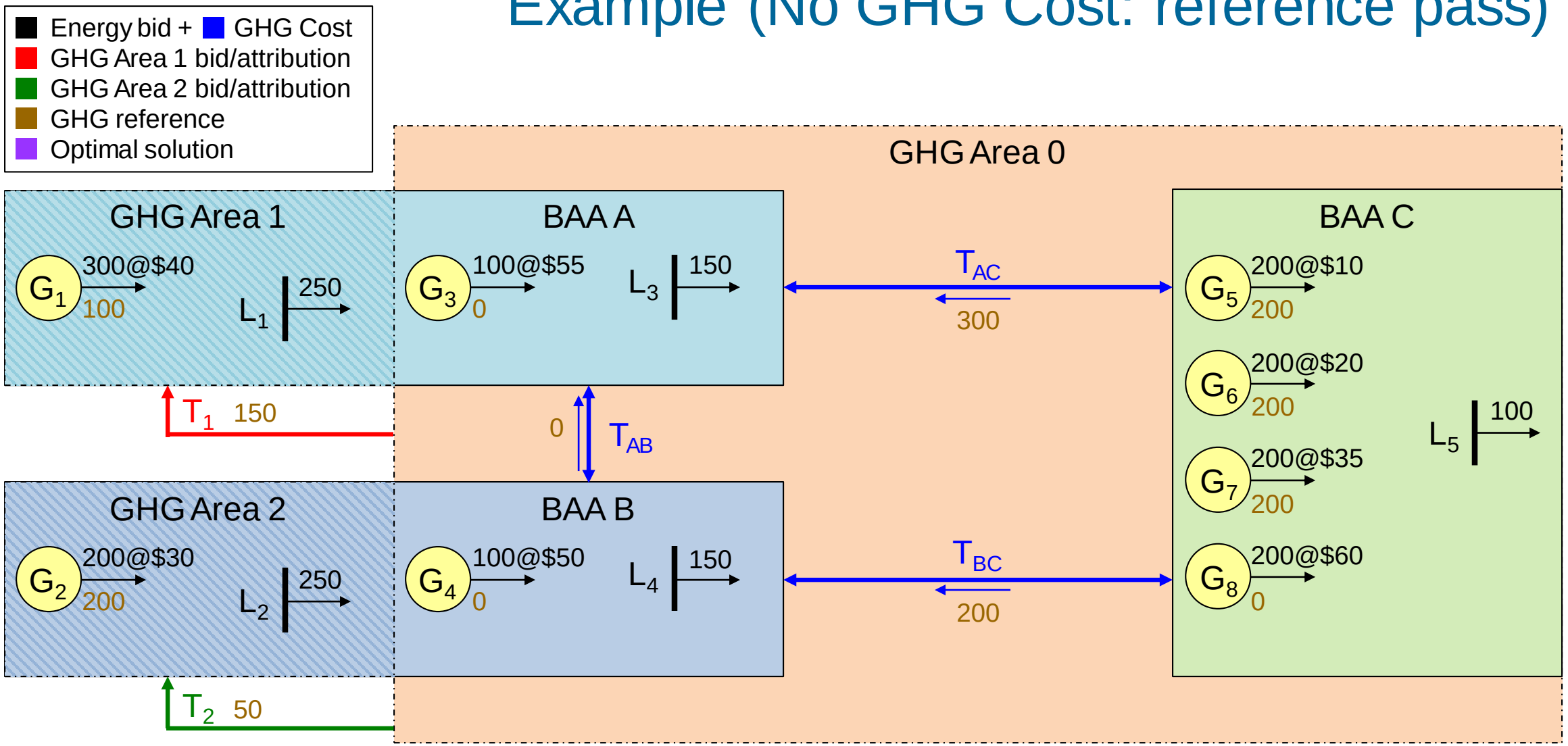
Example (network)



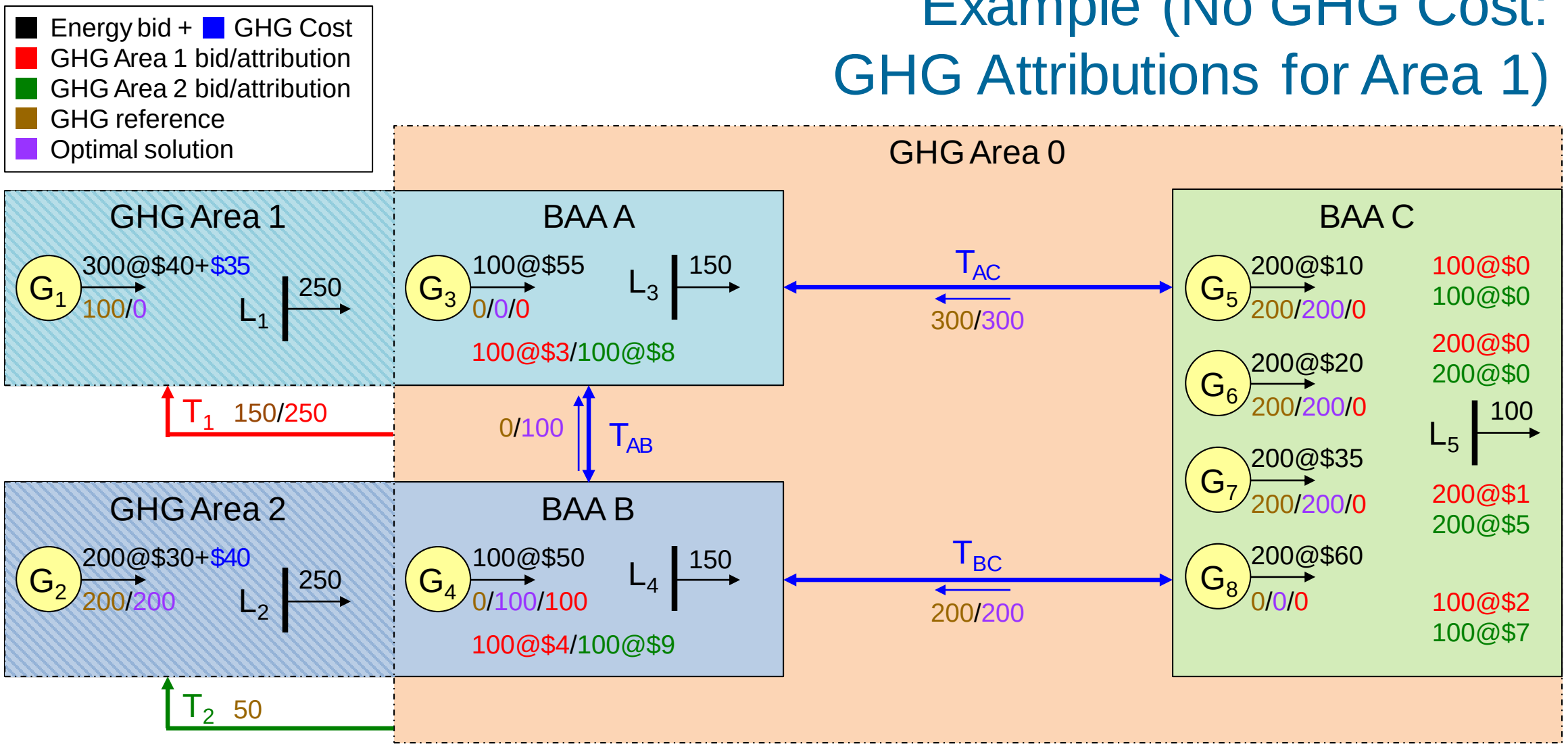
Example (bids)



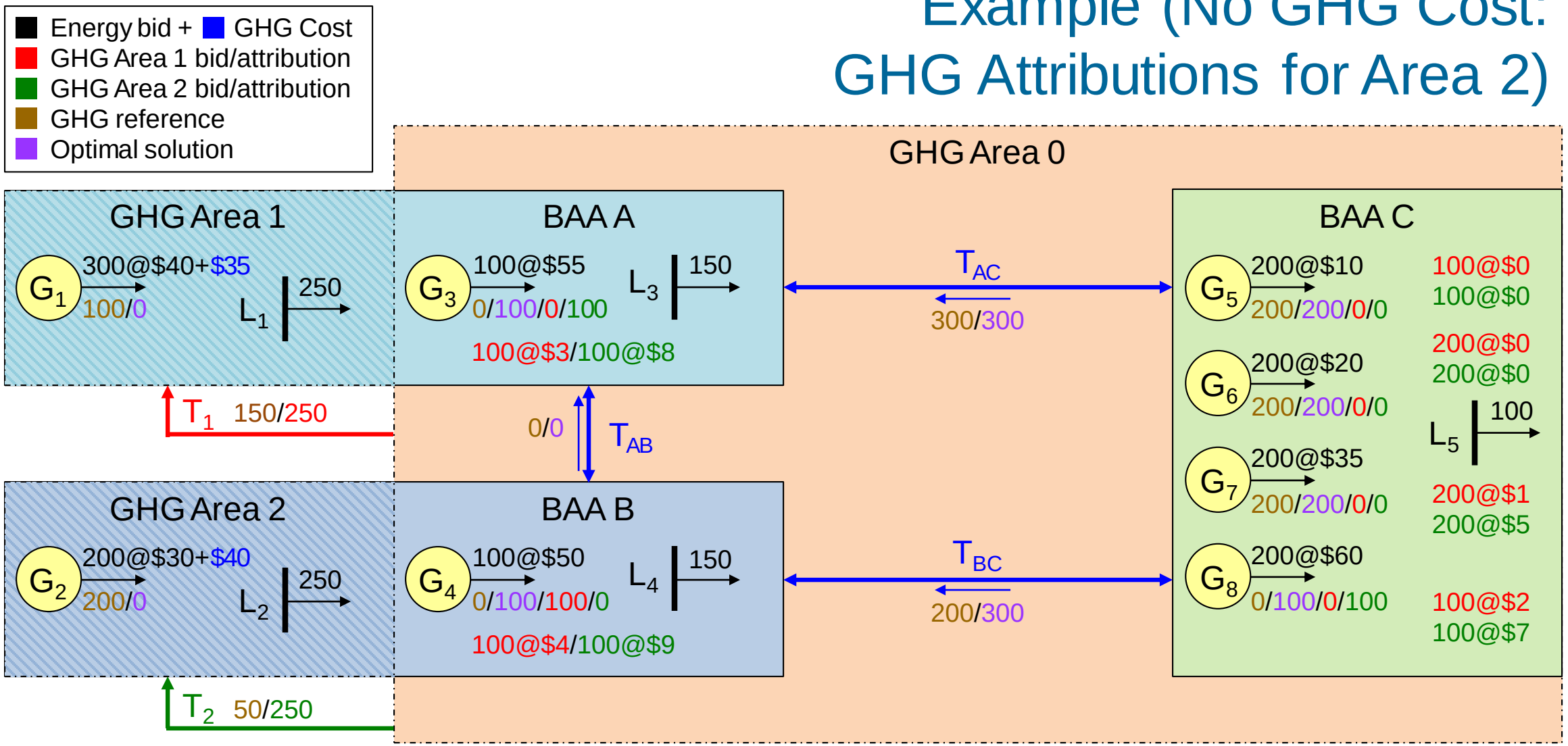
Example (No GHG Cost: reference pass)



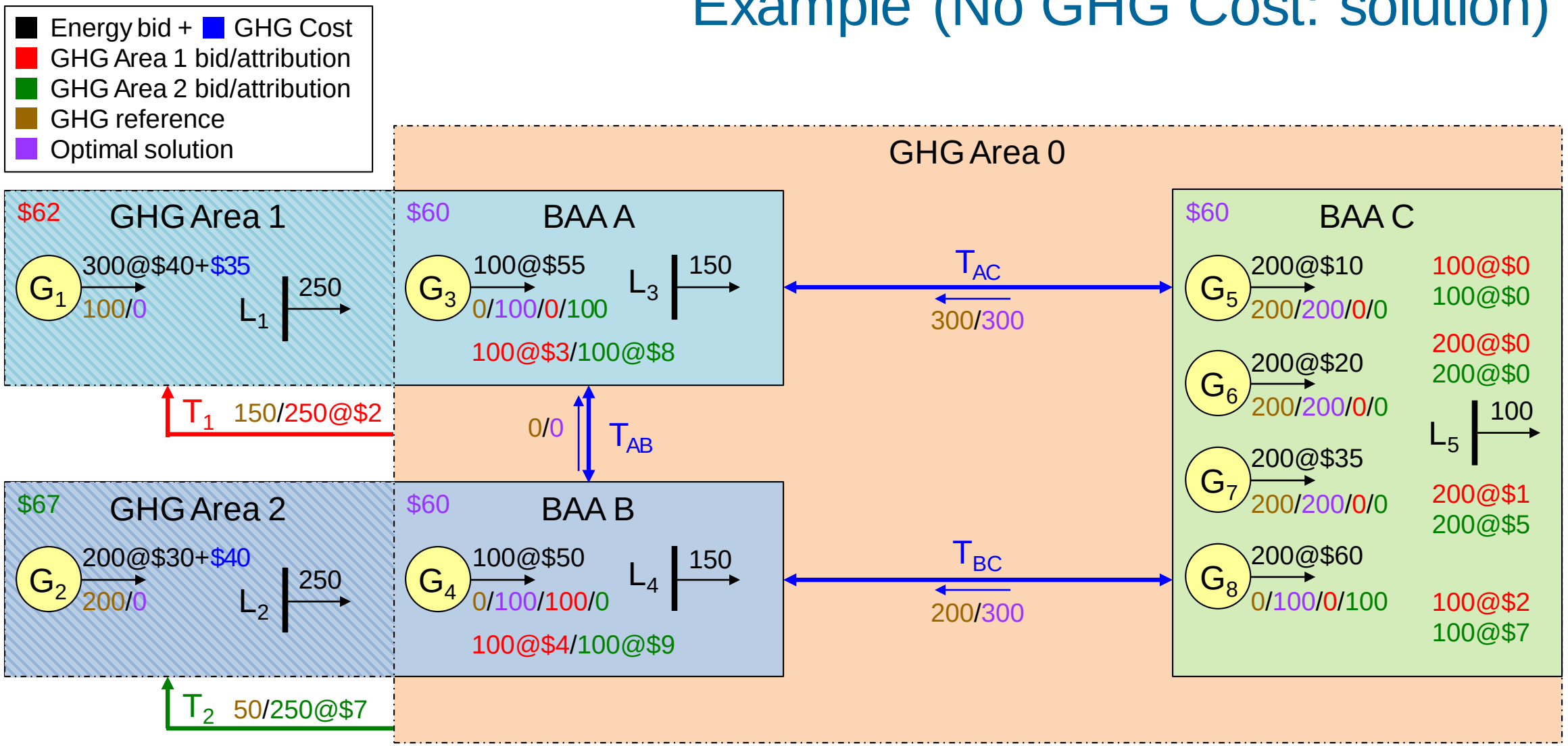
Example (No GHG Cost: GHG Attributions for Area 1)



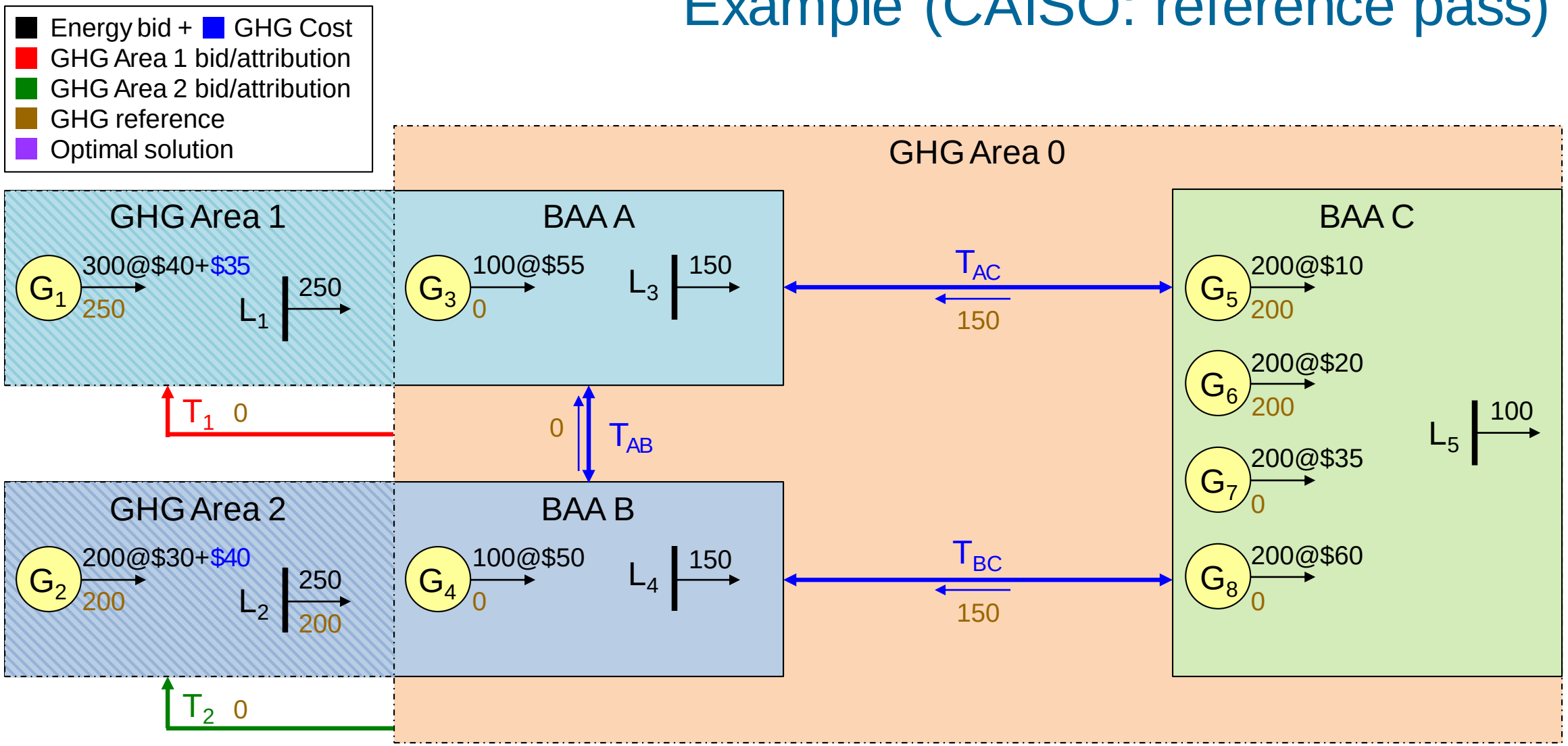
Example (No GHG Cost: GHG Attributions for Area 2)



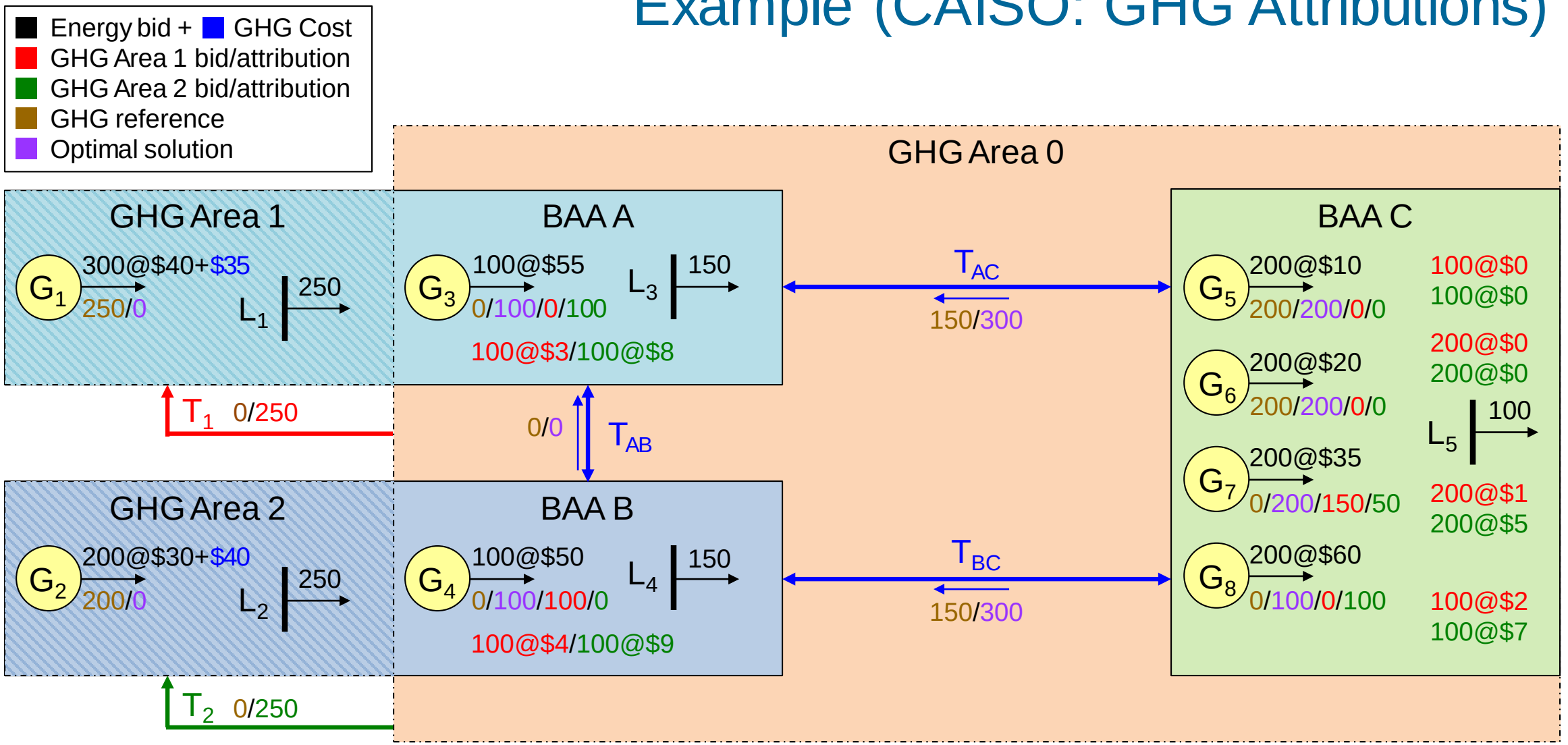
Example (No GHG Cost: solution)



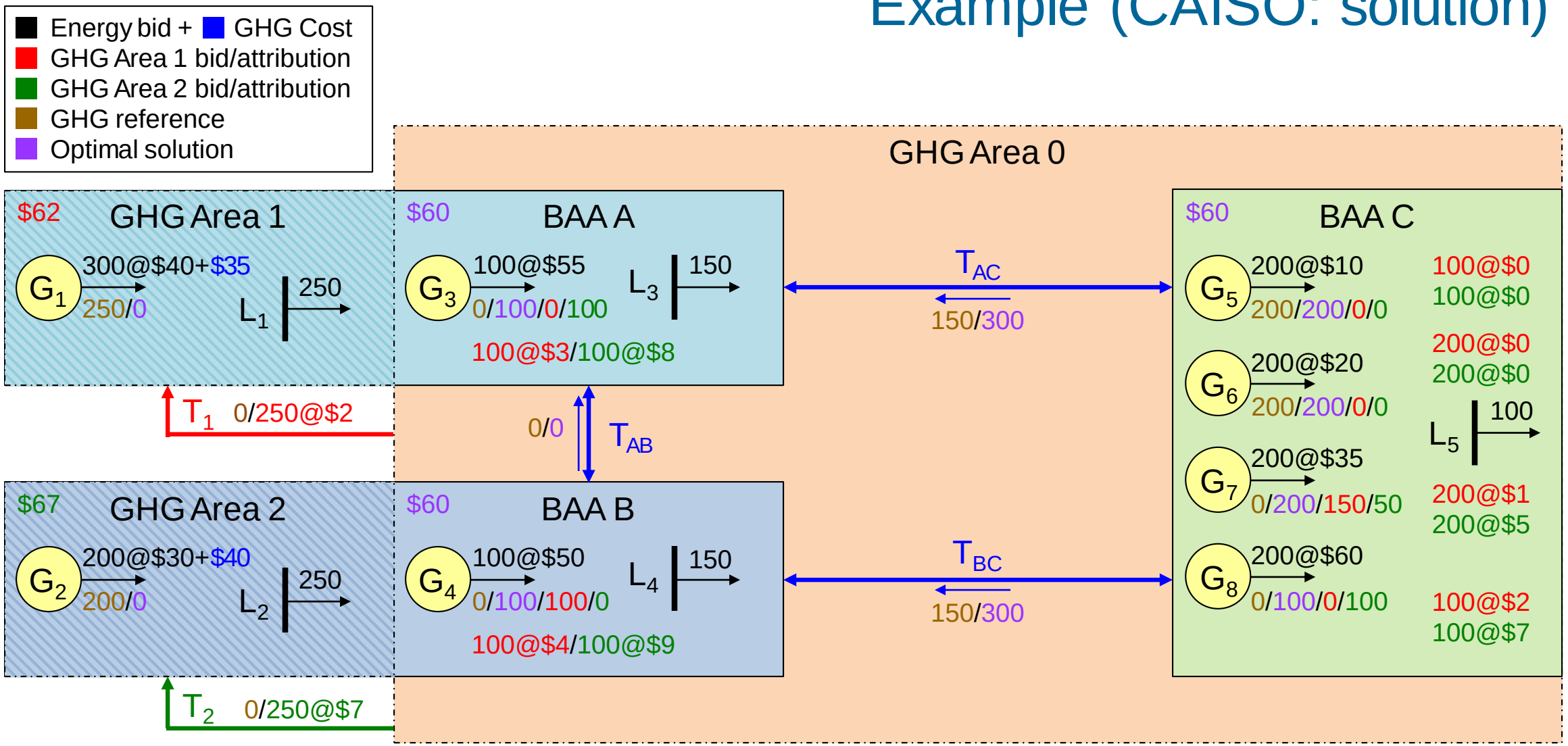
Example (CAISO: reference pass)



Example (CAISO: GHG Attributions)



Example (CAISO: solution)



Example (settlement)

	Marginal Price	CAISO		No GHG Cost	
		Schedule	Charge	Schedule	Charge
G_1	$60+$2	0	0	0	0
G_2	$60+$7	0	0	0	0
G_3	$60; $2; $7	100; 0; 100	–$6,000–$0–$700	100; 0; 100	–$6,000–$0–$700
G_4	$60; $2; $7	100; 100; 0	–$6,000–$200–$0	100; 100; 0	–$6,000–$200–$0
G_5	$60; $2; $7	200; 0; 0	–$12,000–$0–$0	200; 0; 0	–$12,000–$0–$0
G_6	$60; $2; $7	200; 0; 0	–$12,000–$0–$0	200; 0; 0	–$12,000–$0–$0
G_7	$60; $2; $7	200; 150; 50	–$12,000–$300–$350	200; 0; 0	–$12,000–$0–$0
G_8	$60; $2; $7	100; 0; 100	–$6,000–$0–$700	100; 0; 100	–$6,000–$0–$700
L_1	$60+$2	250	$15,000+$500	250	$15,000+$500
L_2	$60+$7	250	$15,000+$1,750	250	$15,000+$1,750
L_3	$60	150	$9,000	150	$9,000
L_4	$60	150	$9,000	150	$9,000
L_5	$60	100	$6,000	100	$6,000
Total		0	$0	0	$650

Example (GHG neutrality)

	Import Reference	Marginal Price	Marginal Cost	Option 1	Option 2			
				Return to GHG Load	Average GHG Price	Average GHG Cost	Return to Regulator	Return to GHG Load
L_1	150	$2	$300	–$300	$0.33	$50	–$50	–$250
L_2	50	$7	$350	–$350	$1.67	$83.33	–$83.33	–$266.67
Total			$650	–$650				

BREAK

Accounting and Reporting Approach

Anja Gilbert
Lead Policy Developer
Market and Infrastructure Policy

Greenhouse Gas Coordination Working Group
January 21, 2025

Agenda

- Stakeholder Feedback: Prior GHG Coordination WG
- Issue Paper and Design
- Next Steps

Stakeholder Feedback from November

- Focus on an LSE level report; no input on SC-mapping
- No consensus on residual rate vs. full report
- Capturing short term contracts may be necessary in the future
- Most recommend using actuals for load data
- Develop an approach for non-participating resources and unknown emission factors
- For the residual rate, consider climate region & approaches that consider gas first/economic stack
- Alternatives are not a replacement for the Accounting and Reporting approach (*e.g.,* BAA level residual with/without a climate region and locational emissions data)

ISSUE PAPER

Current Challenges

- Unspecified transfers may make it difficult for some LSEs to show progress towards state climate goals which may result in self-scheduling
- There is not a market mechanism to ensure that a state or LSE is only served by generation that does not exceed their emission threshold
- The ISO's system looks at system energy

Problem Statement

The market lacks a mechanism that enables Load-Serving Entities and energy users to accurately account for energy and associated emissions used to serve load under regulatory and voluntary GHG reduction and clean energy goals. Sub-issues include:

a. *There is not a market mechanism in states with a declining cap on emissions for utilities to ensure load is served by generation and wholesale market transfers that meet those emission reduction targets.*
b. *There is currently not a way to optimize a portfolio of resources at the EDAM Entity/ WEIM Entity/BAA/LSE level annually from a pre-market, in-market, or post-market perspective over the course of the year to adhere to state emission targets.*
c. *There is not a market mechanism in states with a declining cap on emissions to reflect both the declining cap and a price on carbon in the market for states that have both requirements.*

Summary of the Proposed Accounting and Reporting Approach

On a 5 minute basis for a state, LSE or energy user, calculate:

	Dispatched Owned Resources
+	Dispatched Contracts for Purchase
	Total for owned/contracted
-	Attributed owned/contracted
	Total for owned/contracted - attributed
If Total > load	
-	*Energy @ LSE emissions rate*
If Total < load	
	Energy @ residual emissions rate
+	*(considerations for null power)*
	FINAL TOTAL

Objectives

- Standardized tracking over time
- Accurately assign energy and associated emissions
- More precisely account for transfers to a non-GHG regulation area
- Accommodates different approaches for accounting for clean energy accounting
- No imposition on non-GHG regions

Decision Points

- What data does the ISO produce?
  - Report total
  - Residual rate
- Which entity is the report developed for?
  - ~~BAA~~
  - LSE
  - SC

What data does the ISO produce?

On a 5 minute basis for a state, LSE or energy user, calculate:

	Dispatched Owned Resources
+	Dispatched Contracts for Purchase
	Total for owned/contracted
-	Attributed owned/contracted
	Total for owned/contracted - attributed
If Total > load	
-	*Energy @ LSE emissions rate*
If Total < load	
+	*Energy @ residual emissions rate*

Option 1

Option 2

FINAL TOTAL

Data Produced

	Pros	Cons
Option1 : Residual Rate	• Lower cost • Faster timeline to produce • Entities have all other information	• Entities still must develop their full report
Option 2: Report Total	• Includes entire calculation	• Higher cost • Slower Timeline • Possible data gaps (*e.g.*, load data)

Proposed Accounting and Reporting Approach: Example with Climate Regions

On a 5 minute basis for a state, LSE or energy user, calculate:

	Dispatched Owned Resources
+	Dispatched Contracts for Purchase
	Total, owned/contracted
-	Attributed owned/contracted
	Total, owned/contracted net attribution
	Total for owned/contracted – attributed
+/-	Voluntary intra-GHG area LSE adjustment
	Total, net attribution & intra-GHG LSE adjustment
If Total > load	
-	*Energy @ LSE emissions rate*
If Total < load	
	1.) Add in energy @ climate region residual emissions rate
	2.) If remaining MW shortfall, add in energy @ non-climate region residual emissions rate
+	*(considerations for null power)*
	FINAL TOTAL

Contracts

- Short term approach: reflect long term contracts
- Long term approach: update day ahead, if needed

Approach for non-participating: entity and emission factor

- Non – participating entity: Use master file resources to assume contractual commitments

- Unknown emissions factor: use in descending order
  - Submitted
  - EPA published emissions factor in the Emissions and Generation Resource Integrated Database (“eGRID”)
  - U.S. Energy Information Administration (“EIA”) published emissions factor
  - Calculated by CAISO based on fuel type and heat rate

Timeline: Accounting and Reporting Approach

2025

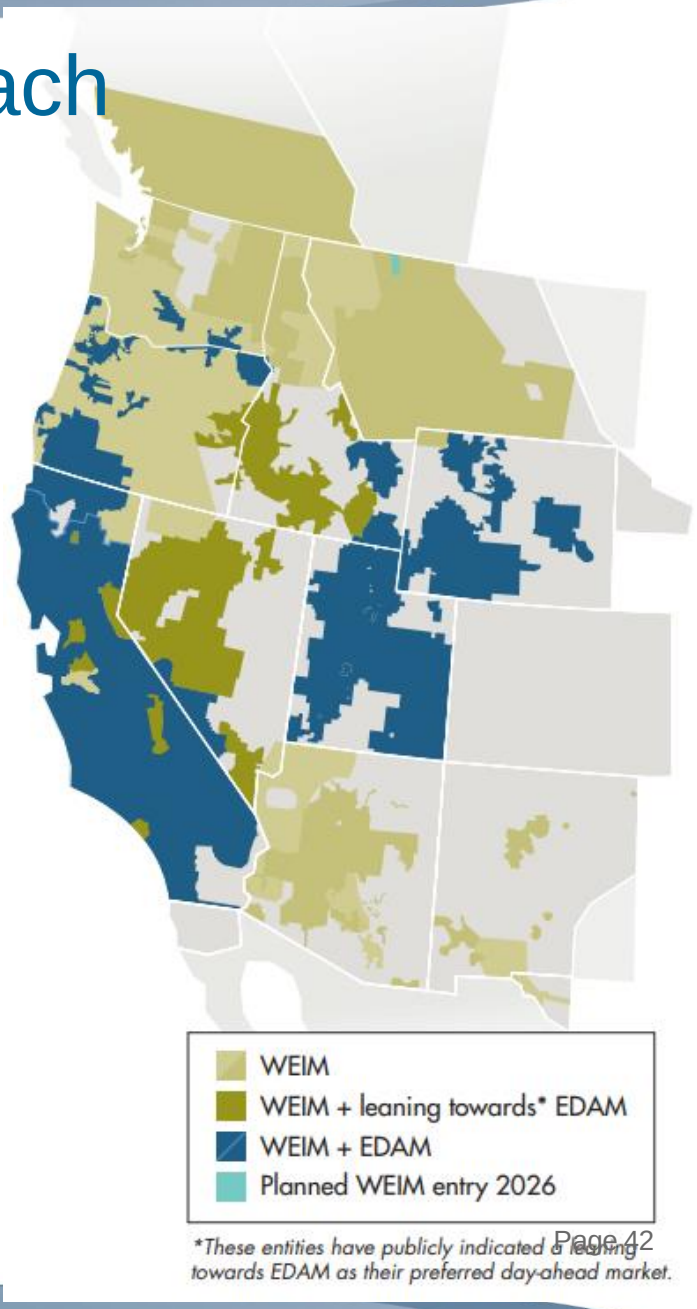
Stakeholders align on report attributes and format

2026

CAISO could provide interim BAA metrics *(more precise unspecified transfer rate)*

Post-EDAM GO Live

CAISO produces the Accounting and Reporting Approach



Next Steps

- Smaller session(s) with stakeholders that plan to use the report to co-develop format, to bring to a future working group meeting
  - Contact Anja Gilbert (agilbert@caiso.com) if you would like to participate
- Comments on Issue Paper and 1/21/25 GHG Coordination working group meeting due: February 11, 2025
- Next GHG Coordination meeting: March 11, 2025
  - Contact Isabella Nicosia (inicosia@caiso.com) if you would like to present

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