Future EDAM Congestion Revenue Allocation

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Topics

- Loopflow Impacts and Pricing
- Market Design Considerations
- EDAM Evolution
- Transition Considerations

Loopflow Pricing

This discussion focuses on the pricing of loopflow in EDAM, WEIM and other markets, and the allocation of associated congestion charges.

- We need to have as context for this discussion that loopflow congestion charges are a small portion of overall congestion charges in WEIM and will be in EDAM as well.
- Loopflow congestion pricing and allocation rules can nevertheless have a significant effect on market efficiency.
- Loopflow congestion costs can arise as a result of:
  - Inter-balancing area intertie schedules;
  - Intra balancing area dispatch of balancing area generation to meet balancing area load;
  - WEIM or EDAM dispatch to meet market load.

Loopflow Pricing

There is an intrinsic potential for inter-balancing area transactions to result in loopflows over parallel systems.

- This potential is a consequence of the fact that power flows over all parallel paths from source to sink.
- These loopflows are generally small for generation dispatched to meet load within the same balancing area, but this is not the case if the balancing areas are large (e.g. PJM after its 2004 expansion, or MISO since 2005) or if some balancing area generation is electrically remote from load.
- The WEIM and EDAM market dispatch can also create flows on constraints in balancing areas other than those in which generation is dispatched up and down.

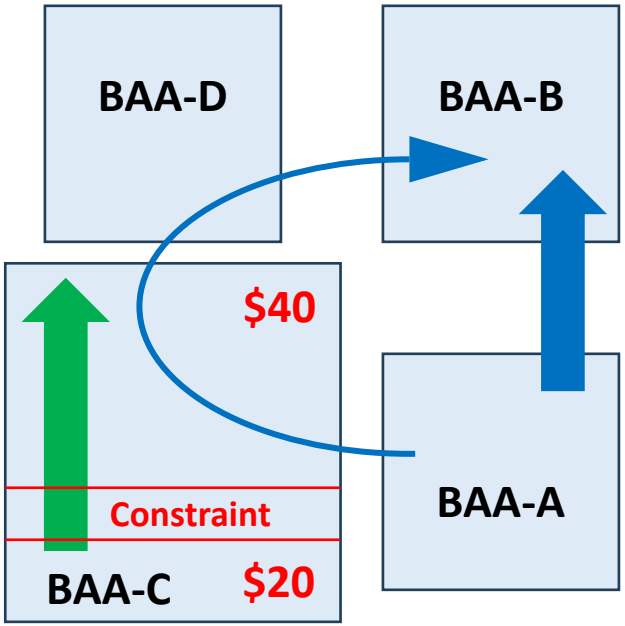
Loopflow Pricing

Loopflows do not have a material impact on adjacent systems if there is no transmission congestion.

- When there is transmission congestion, loopflows can raise the cost of meeting load in an adjacent balancing area by reducing the transfer capability available for use to meet native load.
- My understanding is that the WEIM does not assess the impact of base schedules on neighboring balancing areas when evaluating base schedule feasibility and does not collect congestion charges on base schedules.
- WEIM settlements price the impact of market flows on constraints in other balancing areas if the dispatch differs from the base schedule,

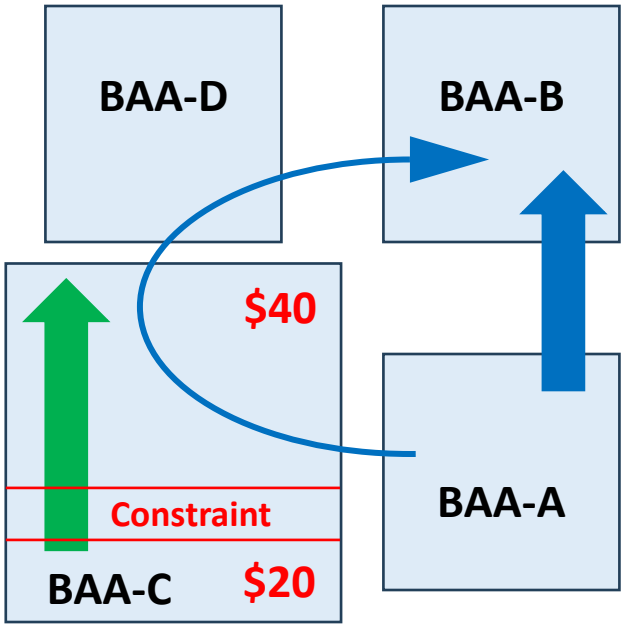
Loopflow Pricing

The graphic below illustrates the potential for transactions between balancing areas A and B to create loopflows over a constraint internal to balancing area C. These loopflows reduce the transfer capability available to meet load in the northern part of balancing area C with lower cost generation in the southern part of balancing area C



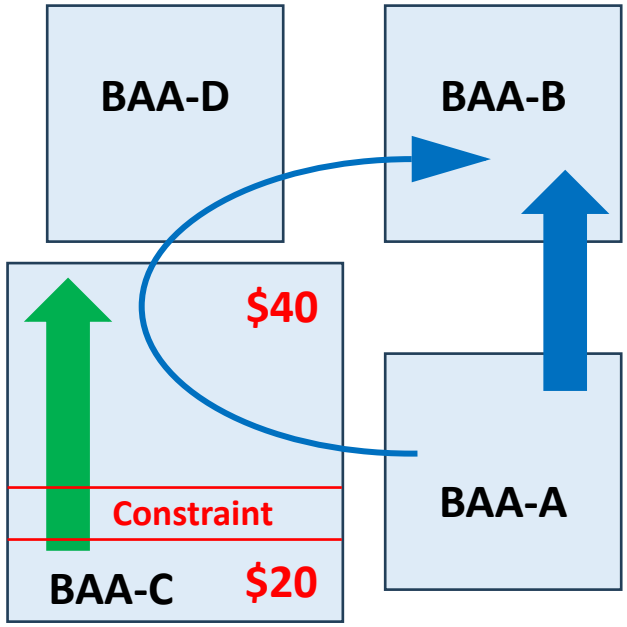
Loopflow Pricing

The loopflow impacts would be the same if the dispatch of generation in balancing area A to meet load in balancing area B were the result of the WEIM market dispatch.



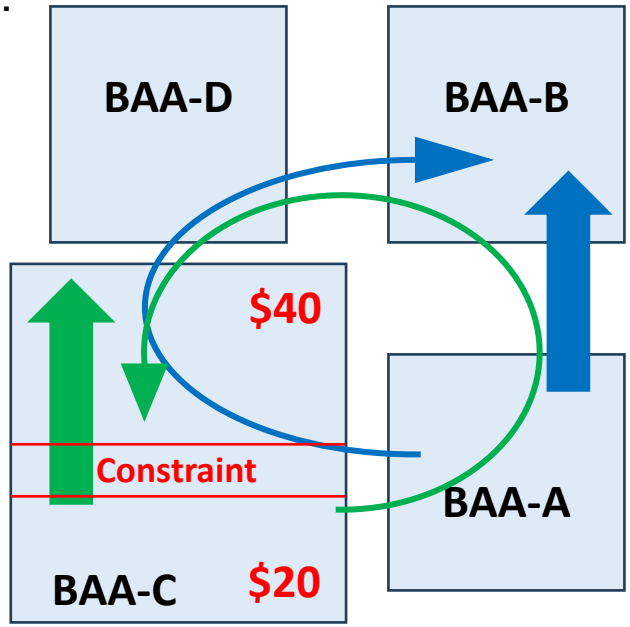
Loopflow Pricing

With LMP pricing of WEIM flows, the congestion charge for flows over the binding constraint in BAA C would be greater than or equal to the as bid cost savings to BAA C load from dispatching generation in the southern part of BBA C to meet load in the north. Hence, BBA C rate payers would not be adversely impacted by the loopflow if they receive the congestion charges for loopflows on the internal constraint. However, BAA C rate payers would be adversely impacted if the congestion charges on the loopflows were rebated to another balancing area.



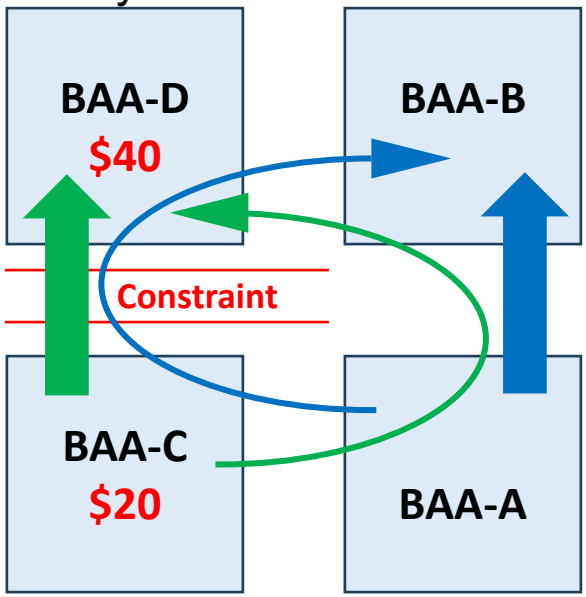
Loopflow Pricing

On the other hand, balancing area C load could also benefit from loopflows from the southern part of balancing C when they flow through balancing areas A and B to meet load in the northern part of balancing area C. These loopflows would reduce the impact of generation in southern C on the constraint and allow more generation in southern C to be dispatched to meet load in the north.



Loopflow Pricng

It is also possible for loopflows to use up transfer capability between balancing areas, reducing the transfer capability available to meet balancing area load with low cost imports. In this example, loop flows from A through C into D and B would reduce transfer capability available between balancing areas C and D. However, loopflows from C into A into B and into D would increase the transfer capability available to BAAs C and D.



Market Design Considerations

Several considerations should be kept in mind in evaluating alternative congestion rent allocation designs:

- Tying allocation of congestion rents to the use of firm transmission, or to the dispatch of generation to meet balancing area load, will generally create inefficient use-it-or-lose-it self-scheduling incentives. Other market areas have tried hard to avoid creating such incentives.
- These inefficient self-scheduling incentives are particularly strong in the go-live EDAM design which explicitly requires that resources self-schedule in order to be eligible for congestion charge rebates.
- In addition to contributing to market inefficiency and foregoing potential EDAM efficiency benefits, the self-schedule based design creates potential cost shifts between those market participants who are readily able to self-schedule resources contributing to congestion and those market participants that are often not able to self-schedule such resources for one reason or another.

Market Design Considerations

My understanding is that there is no requirement that transactions self-scheduled in EDAM (the day-ahead market) be self-scheduled in real-time. This is mostly positive from an efficiency perspective, as it allows resources incented to self-schedule by EDAM rules to participate in the real-time dispatch.

- Nevertheless, increased self-scheduling in EDAM can produce inefficient real-time outcomes because the EDAM unit commitment resulting from self-schedules incented by congestion rent allocation rules may be inefficient. If low cost resources are not committed in EDAM because they are displaced by self-scheduling of higher cost resources, the high cost resources self-scheduled in EDAM may have to be dispatched in real-time.
- On the other hand, rebating congestion charge for the full amount of OATT transmission entitlements scheduled in EDAM may result in a quality of transmission service much better than traditional OATT service and increase congestion costs in settling native load relative to the WEIM market.

Market Design Considerations

Several considerations should be kept in mind in evaluating alternative congestion rent allocation designs (continued):

- Paying rights holders for counter-flow provided by OATT transmission as part of the market dispatch results in better than OATT service.
  - This will nevertheless be efficient and will not result in congestion rent shortfalls if the increased prevailing flows enabled by the purchase of counterflow pay full congestion costs;
  - This may not be efficient, and may result in congestion rent shortfalls, if the increased prevailing flows enabled by the purchase of counterflow do not pay full congestion costs. This could be the case if the increased prevailing flows are associated with increased self-schedules.

Market Design Considerations

Several considerations should be kept in mind in evaluating alternative congestion rent allocation designs (continued):

- Allocation of congestion rents to balancing areas based on loopfow congestion charges can result in an incentive to inefficiently schedule balancing area generation, because the effective generation price would be higher than the dispatch price.
    - With such a design there would appear to be an ability for the entity that is self-scheduling in EDAM to submit economic offers in real-time, resulting in the self-scheduled resource being dispatched down and selling back the loopflows the entity did not pay for.
    - These incentives and cost shifts might be immaterial in practice for particular balancing areas if loopflow congestion charges are generally small and large charges are unpredictable and only known after the fact. However, these incentives and cost shifts might be large for some balancing areas.

Market Design Considerations

We do not know how the use of the WECC transmission system will evolve over the next decade but if load growth in part takes the form of large loads at new locations and there are increasing levels of renewable generation output at locations remote from load, there may be rising levels of inter-balancing area loopflows that will require changes to past WECC practices. [1]

- In the east, rising levels of parallel flows were addressed with TLRs. Leading to rising levels of Transmission Loading Relief (TLRs) use over time.
- TLRs, unscheduled flow mitigation, and similar curtailment practices and rules are not an efficient method for managing congestion and have limitations in maintaining reliability.
- Most eastern regions have shifted from TLRs to managing parallel flow impacts through joint congestion management and flow entitlements.

1. For an illustration see Scott Harvey, Congestion Rent Allocation, Market Surveillance Committee Meeting, May 2, 2025, Figure 5 p. 18. https://www.caiso.com/documents/presentation-extended-day-ahead-market-congestion-revenue-allocation-may-02-2025.pdf Suppose that Load B is a new data center and the generation at A is a new windfarm. The new generation in RED BAA balancing area mostly flow to load in Red BAA through Green BAA.

Market Design Considerations

Joint congestion management designs in the east replace TLRs with congestion charges for loopflows as is the case in the WEIM dispatch and the as filed EDAM design.

- PJM and MISO, for example, often make payments for flows over constraints in the other balancing area. The net payments from PJM to MISO were $40.9 million in 2024. [1]
- PJM and MISO have also agreed upon firm flow entitlements on the other's system, congestion charges are only paid for flows in excess of the flow entitlements. [2]

1. Monitoring Analytics, State of the Market Report for PJM, Volume 2, 2024 March 13, 2025 page 502 Table 9-38.
2. Ibid pp. 500-501. Note that the PJM IMM apparently recommends eliminating firm flow entitlements.

EDAM Evolution

A long-run goal should be development and implementation of some type of financial congestion hedge that does not create use-it-or-lose-it incentives and supports economic dispatch across EDAM and the WEIM. This will require:

- Developing and agreeing upon an allocation and/or auction design for the financial rights, including the application of a simultaneous feasibility test to existing OATT service and native load entitlements to transmission;
- Agreement on the appropriate time of day granularity for the financial right awards;
- Developing a method to apply a simultaneous feasibility test to incremental OATT sales or replacing OATT sales as a transmission funding mechanism;
- Developing rules to assign auction revenues, ARRs, and or residual congestion rents to balancing areas;
- Development of a mechanism for allocating the cost of congestion rent shortfalls due to transmission outages among the responsible balancing area or other transmission owner and transmission customers;

This will require a significant effort and will not be achieved overnight.

EDAM Evolution

An interim balancing area congestion rent allocation mechanism that assigns congestion rents on internal constraints to balancing areas based on flow entitlements and divides congestion rents on inter-balancing area constraints could provide a starting point for EDAM/WECC evolution.

- Such a design could be adapted to assign congestion rent shortfalls/increased cost of meeting load due to infeasibilities and transmission outages to the responsible balancing area or could assign some of these costs to transmission customers.
- Such a design could be combined near-term with a fixed amount of balancing area flow entitlements on a set of constraints in adjacent balancing areas. This cap could be defined in aggregate $ terms, on a megawatt basis or as a fraction of the rating of the monitored element for the binding contingency.
- Near term each balancing area could develop its own design for hedging customers purchasing firm OATT service based on congestion charge payments and receipts.
- Intra-balancing area settlements based on flow entitlements may become more complex as the number of balancing areas in EDAM rises and new transmission is built, so settlements based on flow entitlements may be viewed as an interim step before a transition to some form of a financial rights based design.

Transition Considerations

There may be difficulty in reaching agreement on joint congestion management and flow entitlements. WECC utilities may need to pursue a dual approach of trying to reach agreement on joint congestion management and flow entitlements, while also developing expanded unscheduled flow mitigation processes that could be filed at FERC and applied to entities with whom a joint congestion management design cannot be agreed upon.

- Both approaches may require improvements to current flow impact calculations for some or all market operators.
- Both approaches will also likely require changes in operating practices.
- A joint congestion management design with flow entitlements will also have settlement system impacts.

Transition Considerations

Agreement on balancing area flow entitlements would facilitate a long-run transition to a design which includes auction sales of financial transmission rights, with flow entitlements serving the role of ARRs in allocating revenues from sale of incremental transfer capability to the BAA making the flow entitlement available for sale.

- Each transmission constraint, and hence each flow entitlement, would be priced in the auction.
- Flow entitlements made available to support the sale of financial rights in the auction would assign the revenues from those sales to a specific balancing area (or other rights seller).
- Financial transmission rights based on flow entitlements would be settled based on the flow entitlements, i.e. auction shift factors, not day-ahead market shift factors, thereby eliminating an apparently important source of congestion rent shortfalls.