



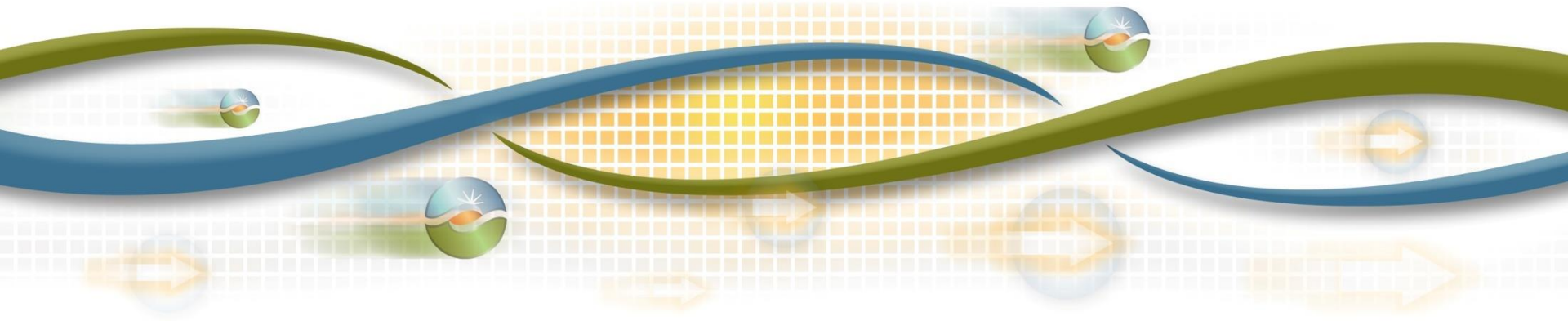
Briefing on greenhouse gas accounting improvements

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Observations of EIM dispatch optimization

- Least cost dispatch can have effect of sending low emitting resources to ISO, while not accounting for secondary dispatch of other resources to serve external demand
- Least cost dispatch can result in avoided curtailment of ISO renewables by displacing emitting resources to serve external demand

ISO is working with ARB to address concern with whether GHG attribution captures the atmospheric effects of EIM least cost dispatch

Atmospheric effect is not always apparent when GHG attributed to an EIM base schedule

- If the attributed resource would have generated anyways, then another resource's emissions may be higher
- But, if the attributed resource would not have generated to serve non-ISO demand, then the resource's emissions are correct atmospheric effect.

Enhancement - Modify optimization, but maintain resource specific cost and attribution (1 of 2)

- GHG attribution only if the resource is incrementally dispatched above new “GHG allocation base” to support EIM transfer into ISO
- Submitted base schedules are used for imbalance settlement solely and are not optimized outside of CA
- Requires a two-pass process
 - Pass 1: optimize schedules without transfers to CA to determine “GHG allocation base” of non-CA resources
 - Pass 2: optimize schedules allowing transfers to CA and enforce constraint that attribution must come from resources dispatched above “GHG allocation base”

Enhancement - Modify optimization, but maintain resource specific cost and attribution (2 of 2)

- Real-time dispatch is used to operate the grid
 - Must solve market optimization within 5-minutes
 - Solving the market twice to add GHG accounting functionality
 - Current computational power would require simplifying first pass to ensure RTD successfully completes
- GHG accounting accuracy is significantly improved, small “leakage” can still occur
 - Simplifying assumptions needed to reduce solve time of first pass
 - Congestion management once transfers allowed into CA
 - Can’t let the perfect be the enemy of the good

Approaches to minimize solve time of first pass

- Avoid full unit commitment by using prior unit commitment from second pass
- Relax the ramp constraints between the binding and advisory intervals
- Calculate advisory interval GHG allocation base without network constraints
- Stagger market runs so that when the second pass is completed, the first pass for the next market starts immediately

How should ISO treat an external resource under contract as ISO load serving entity?

- Assume a California load serving entity has contracted with a wind resource in Oregon which bids \$0.00 / MWh
- Using location only for the first pass, the Oregon unit could be used to back down a gas unit outside of California
- This would set the “GHG allocation base” of the wind resource to its forecast, thus this resource cannot be incrementally dispatched in the second pass
- Therefore, a transfer to California can only be supported by incrementing a gas unit and incurring the GHG expense

Need to identify which supply is included in the first pass to determine the GHG allocation base for resources outside of California

- When setting up a resource, the scheduling coordinator identifies if the resource is California supply in Masterfile
 - Considering making this a bid parameter
- All supply located outside the California state boundary will bid a separate GHG component
 - As is done today, if a resource meets its ISO must offer obligations and is not awarded, its output can be contracted bilaterally with no California GHG obligation
- GHG allocation base equals the base schedule for California supply in EIM entity BAA
 - Addresses double counting base for GHG accounting

CARB has proposed a bridge to retire allowances until ISO can implement enhancement

- Two-pass can't be implemented in 2017 to support ARB compliance year 2018
- Evaluating how to minimize the solve time needed determine the GHG allocation base for resources outside ISO

Real-time market enhancements initiative will further improve renewable integration

- Integrate FMM and RTD into single market optimization
- 5 minute unit commitment
- 5 minute ancillary service procurement
- 5 minute EIM resource sufficiency evaluation
- 5 minute Market Power Mitigation (Implements 2017)

Two pass GHG enhancement must work with additional functionality being added to RTD