California ISO

Intertie Schedule Modeling Evolution on CAISO Balancing Area Interties – Stakeholder Workshop

March 18, 2026

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Please keep comments brief and avoid repeating points already made to ensure everyone has an opportunity to participate in a robust discussion.

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Please remember to state your name and affiliation before making your comment.

If you are connected to audio through your computer or used the ‘call me’ option, select the raise hand icon located on the bottom of your screen. Start speaking after 2 second after your unmuted.

If you are connected on the phone line only and not the Webex dial *3 to be added to the raise hand queue.

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Agenda

Time	Topic	Presenter
1:00 – 1:05 PM	Welcome	Christina Guimera
1:05 – 1:30 PM	Meeting objectives and introduction	Milos Bosanac
1:30 – 3:00 PM	Generation Aggregation Point – Intertie (GAP-Tie) Model	George Angelides
3:00 – 3:15 PM	Break	
3:15 – 4:15 PM	Generation Aggregation Point – Intertie (GAP-Tie) Model - continued	George Angelides
4:15 – 4:30 PM	Upcoming Workshops	Milos Bosanac
4:30 – 4:45 PM	Next Steps	Christina Guimera

Goals of today's *Intertie Schedule Modeling* workshops

- Commence discussion on evolving transitional intertie schedule modeling design on CAISO balancing area interties
- Educational session on modeling design for CAISO balancing area interties (SP-Tie) currently in place (and at EDAM launch) and the GAP-Tie design
- Obtain stakeholder input on additional considerations and topic areas regarding intertie schedule modeling design for upcoming workshops

Intertie Schedule Modeling – *Transitional* Design on CAISO Interties

- As part of the *EDAM implementation workshops,* the ISO committed to retaining the existing intertie schedule modeling design on the CAISO balancing area interties on a *transitional* basis.
  - Retention of Schedule Point Tie (SP-Tie) modeling

- The ISO committed to work with stakeholders to evaluate an orderly transition to a more accurate modeling design for intertie transactions on the CAISO balancing area interties.
  - Consideration of transition to Generation Aggregation Point-Tie (GAP-Tie) modeling on interties
  - Allows time for consideration of potential impacts to commercial arrangements

Existing modeling designs for intertie schedules: SP-Tie and GAP-Tie

- ***SP-Tie modeling of intertie schedules***
  - Intertie transactions at scheduling points are modeled as injection (import) or ejection (export) of energy directly at the intertie location
  - Modeling of fictional physical generator at the intertie location to capture the effects on transmission constraints and effects on price formation
  - SP-Tie modeling is in place currently on CAISO balancing area interties

- ***GAP-Tie modeling of intertie schedules***
  - Transactions at intertie locations are modeled as imports or exports sourcing from aggregate physical generation in a neighboring balancing area
  - Modeling considers the effects of the aggregate generation in the neighboring balancing area to transmission constraints in the market footprint
  - Currently in place at WEIM balancing area interties and will be in effect at EDAM balancing area interties (non-CAISO)

Intertie Schedule Modeling in the EDAM

- With the launch of the WEIM in 2014, the design introduced GAP-Tie modeling on WEIM balancing area interties (non-CAISO).

- GAP-Tie modeling of intertie schedules is considered comparatively more accurate as it seeks to model the source of the intertie transaction from physical generation in a neighboring balancing area.
  - Improved alignment with power flow and congestion management

- With EDAM, the design sought to continue to improve the accuracy of modeling by carrying forward GAP-Tie modeling design to all EDAM interties, including the CAISO balancing area interties.

Transitional design for modeling CAISO balancing area intertie schedules

- In EDAM, intertie schedules on CAISO balancing area interties will continue to be modeled under the SP-Tie modeling design on a *transitional* basis.
- Market participants will continue to submit intertie transactions at CAISO interties with non-EDAM balancing areas as they do today.
- On EDAM internal interties – between the CAISO and another EDAM balancing area – import intertie transactions will continue to be supported under the SP-Tie model.
  - Limited to resource adequacy and RPS contract import transactions where source is unknown or otherwise outside of the EDAM footprint
- The transitional design for intertie schedule modeling on CAISO balancing area interties will be in place until replaced with a new modeling design.
  - Filing currently pending at FERC

Scope of Today's Workshop

- Introductory educational workshop focused on:
  - Establishing understanding of **SP-Tie** intertie schedule modeling and associated price formation
  - Establishing understanding of **GAP-Tie** intertie schedule modeling and price formation
  - Comparative assessment of the two modeling approaches through examples

- Seeking stakeholder input on aspects of intertie schedule modeling to discuss at upcoming workshops to facilitate evaluation of the design.
  - Stakeholders are encouraged to provide input on topic areas for upcoming workshops

California ISO

Generation Aggregation Point — Intertie (GAP-Tie) Model

George Angelidis, Ph.D.

Executive Principal

Power Systems and Market Technology

Workshop on Intertie Schedule Modeling Evolution on CAISO Interties

March 18, 2026

Definitions

- Scheduling Point: a network location for intertie scheduling
  - Used for distributing intertie schedules for power flow and LMP calculations
- Generation Aggregation Point (GAP): an aggregate Scheduling Point
  - An aggregation of supply resources in a BAA
  - Default Generation Aggregation Point (DGAP)
    - Used for default non-resource-specific intertie participation
    - It includes all supply resources in a BAA
- Intertie (Tie): a logical transmission connection between BAAs
  - It corresponds to one or more physical transmission lines
  - It is used for tagging intertie schedules subject to a scheduling limit (ITC/ISL)
  - Intertie schedule is generally different from the intertie power flow

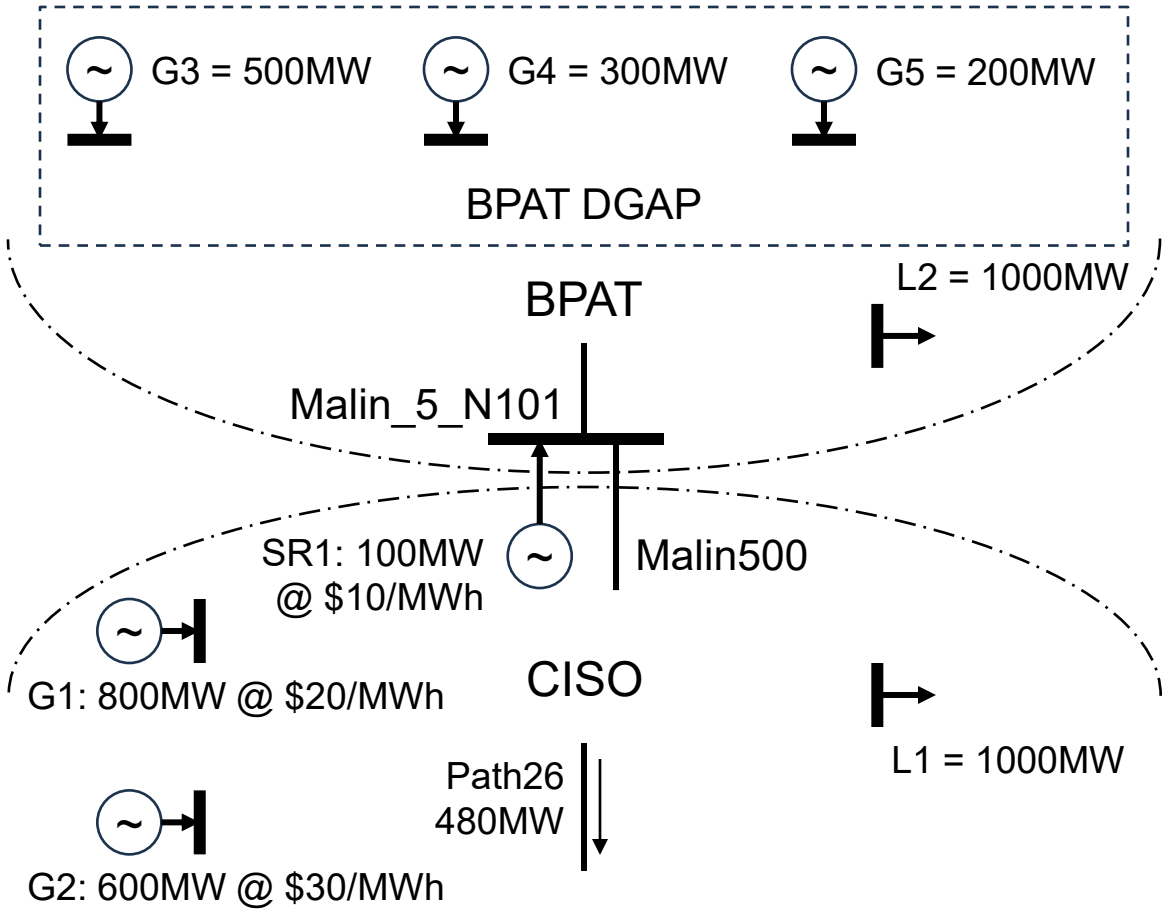
Scheduling Point – Intertie (SP-Tie) combination

- SP-Tie LMP
  1. Marginal Energy Cost (MEC)
     - Shadow price of the power balance constraint of the associated BAA: λ_j
  2. Marginal Loss Cost (MLC)
     - Cost sensitivity of active power loss at the SP: $\lambda_j \left(\frac{1}{LPF_i} - 1\right)$
  3. Marginal Congestion Cost (MCC)
     - Marginal congestion contributions from binding power flow constraints in the Market Area to the SP: $\sum_k SF_{i,k} P_i$
     - Only for SP-Tie LMP: Shadow price of intertie scheduling limit (ITC/ISL) that constrain import/export and transfer schedules at the associated intertie
  4. Marginal Greenhouse Gas Cost (MGC)
     - Shadow price of GHG attribution constraint for associated GHG Regulation Area

Process for intertie scheduling

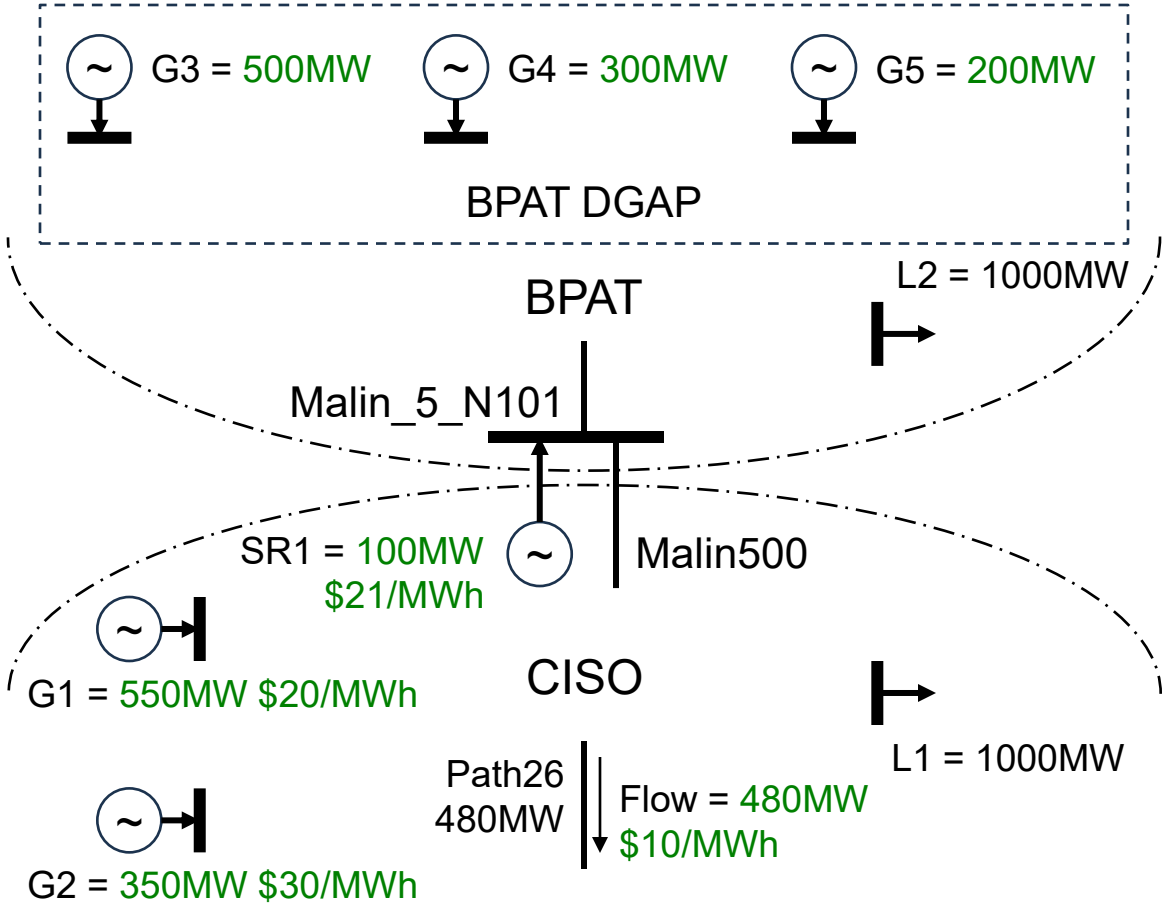
- Select a Tie where the schedule will be tagged
  - Transmission to that intertie must be acquired to tag the schedule
- Select a SP associated with the Tie to use as SP-Tie combination
  - Examples:
    - Malin_5_N101-Malin500 (existing SP-Tie; one-to-one SP-to-Tie association)
    - BPAT_DGAP-Malin500
- Register an Import/Export System Resource at that SP-Tie, or
- Define an Intertie Transaction in SIBR specifying that SP-Tie
- Submit a bid (economic and/or self-schedule) for that resource

Example for existing SP-Tie: Malin_5_N101-Malin500 Setup (Import)



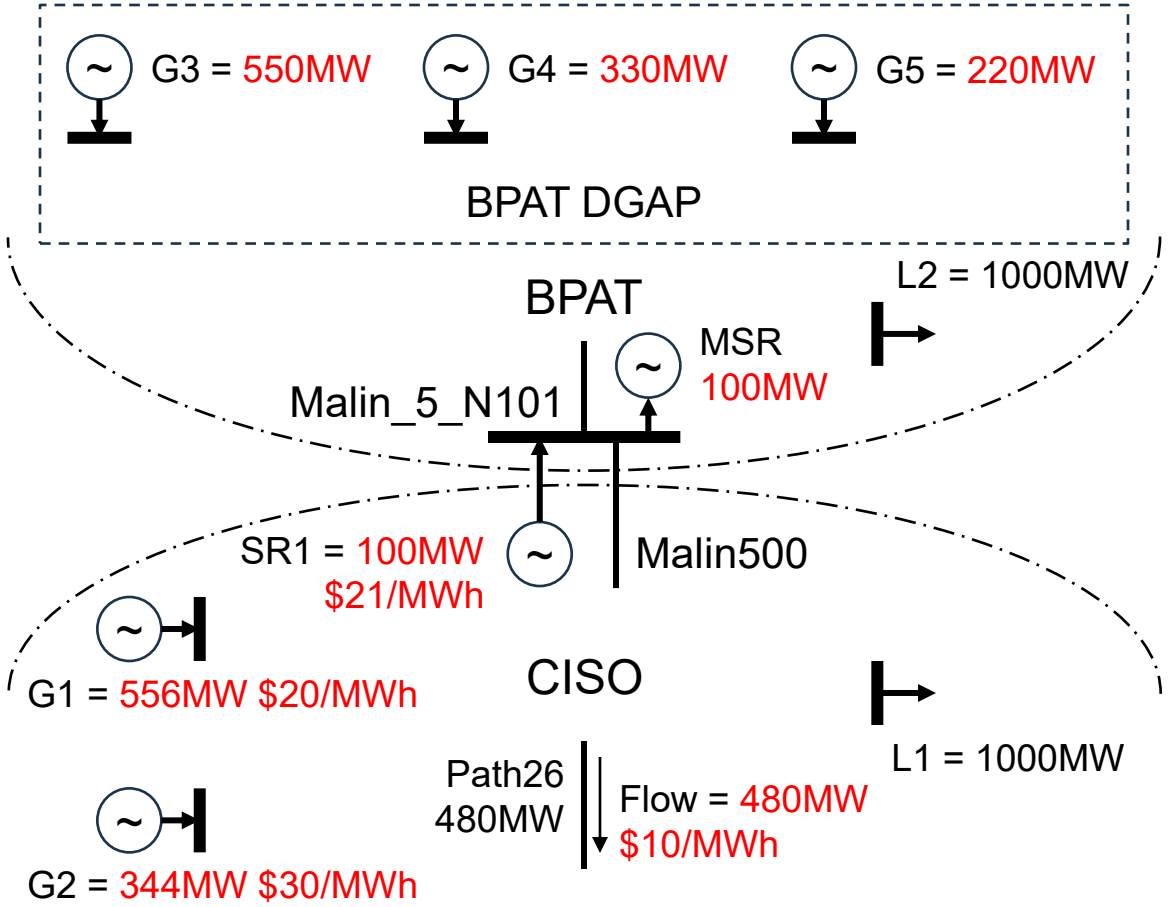
- BPAT demand forecast is distributed to BPAT DGAP
  - Generation Distribution Factors:
    - G3: 0.5; G4: 0.3; G5: 0.2
  - Shift Factor to Path26: 0.34
- SR1 bids 100MW @ $10/MWh
  - Shift Factor to Path26: 0.4
- G1 bids 800MW @ 20/MWh
  - Shift Factor to Path26: 0.5
- G2 bids 600MW @ 30/MWh
  - Shift Factor to Path26: –0.5
- Path26 power flow limit: 480MW

Example for existing SP-Tie: Malin_5_N101-Malin500 IFM Solution (Import)



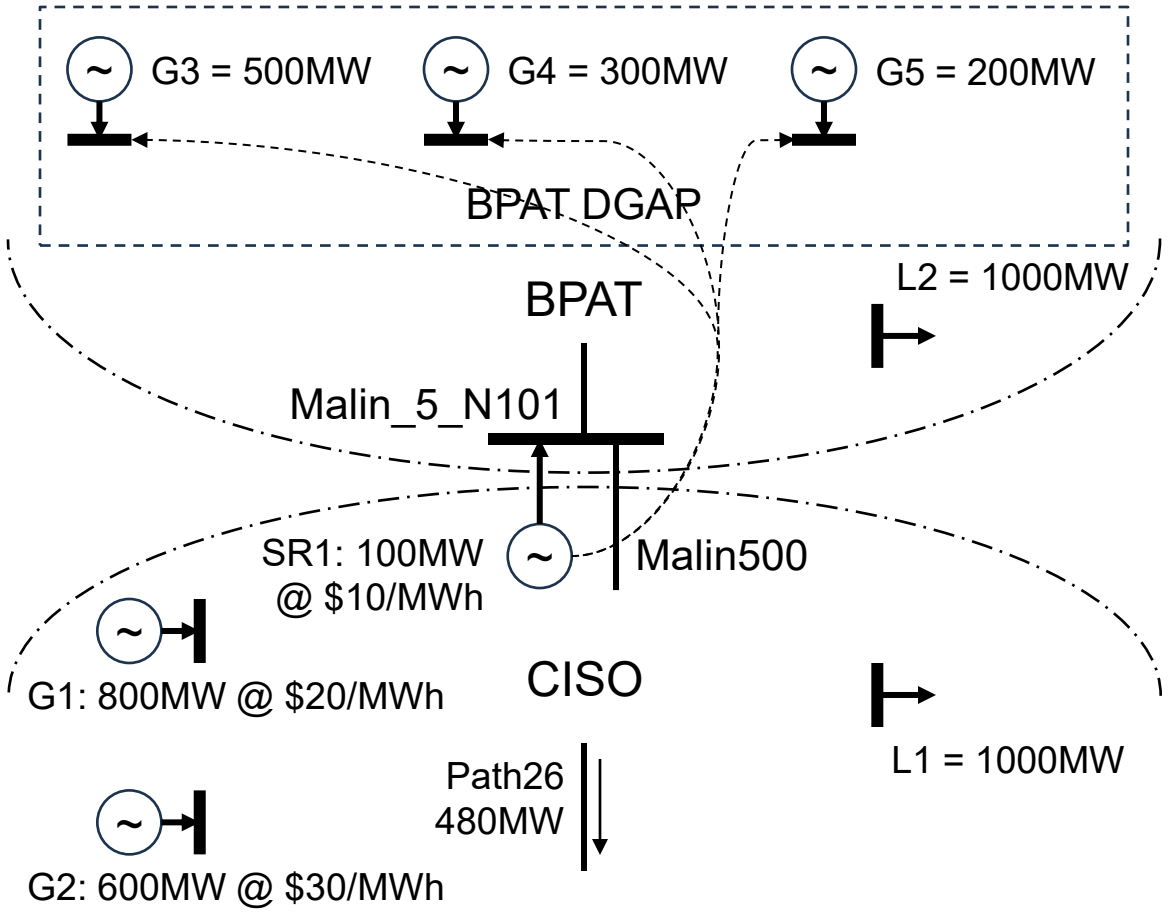
- BPAT DGAP
  - Power flow contribution (PFC) to Path26:
  - 0.34×1000 = 340MW
- SR1 clears for 100MW
  - PFC to Path26 : 0.4×100 = 40MW
- G1 clears for 550MW
  - PFC to Path26 : 0.5×550 = 275MW
- G2 clears for 350MW
  - PFC to Path26 : –0.5×350 = –175MW
- Path26 power flow:
  - 340 + 40 + 275 – 175 = 480MW
- MEC = $25/MWh
- Path26 shadow price = $10/1MWh = $10/MWh
- LMPs:
  - SR1: 25 – 0.4×10 = $21/MWh
  - G1: 25 – 0.5×10 = $20/MWh
  - G2: 25 + 0.5×10 = $30/MWh

Example for existing SP-Tie: Malin_5_N101-Malin500 RTM Solution (Import)



- BPAT:
  - MSR: 100MW base schedule (cancels SR1 PFC to Path26)
  - G3: 550MW base schedule
  - G4: 330MW base schedule
  - G5: 220MW base schedule
  - PFC to Path26 : 0.34×1100 = 374MW
- SR1: 100MW self-schedule
  - PFC to Path26 cancelled by MSR
- G1 clears for 556MW
  - PFC to Path26 : 0.5×556 = 278MW
- G2 clears for 344MW
  - PFC to Path26 : –0.5×344 = –172MW
- Path26 power flow:
  - 374 + 278 – 172 = 480MW
- MEC = $25/MWh
- Path26 shadow price = $10/1MWh = $10/MWh
- LMPs:
  - SR1: 25 – 0.4×10 = $21/MWh
  - G1: 25 – 0.5×10 = $20/MWh
  - G2: 25 + 0.5×10 = $30/MWh

Example for GAP-Tie: BPAT_DGAP-Malin500 Setup (Import)



- BPAT demand forecast is distributed to BPAT DGAP
  - Generation Distribution Factors:
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- SR1 bids 100MW @ $10/MWh
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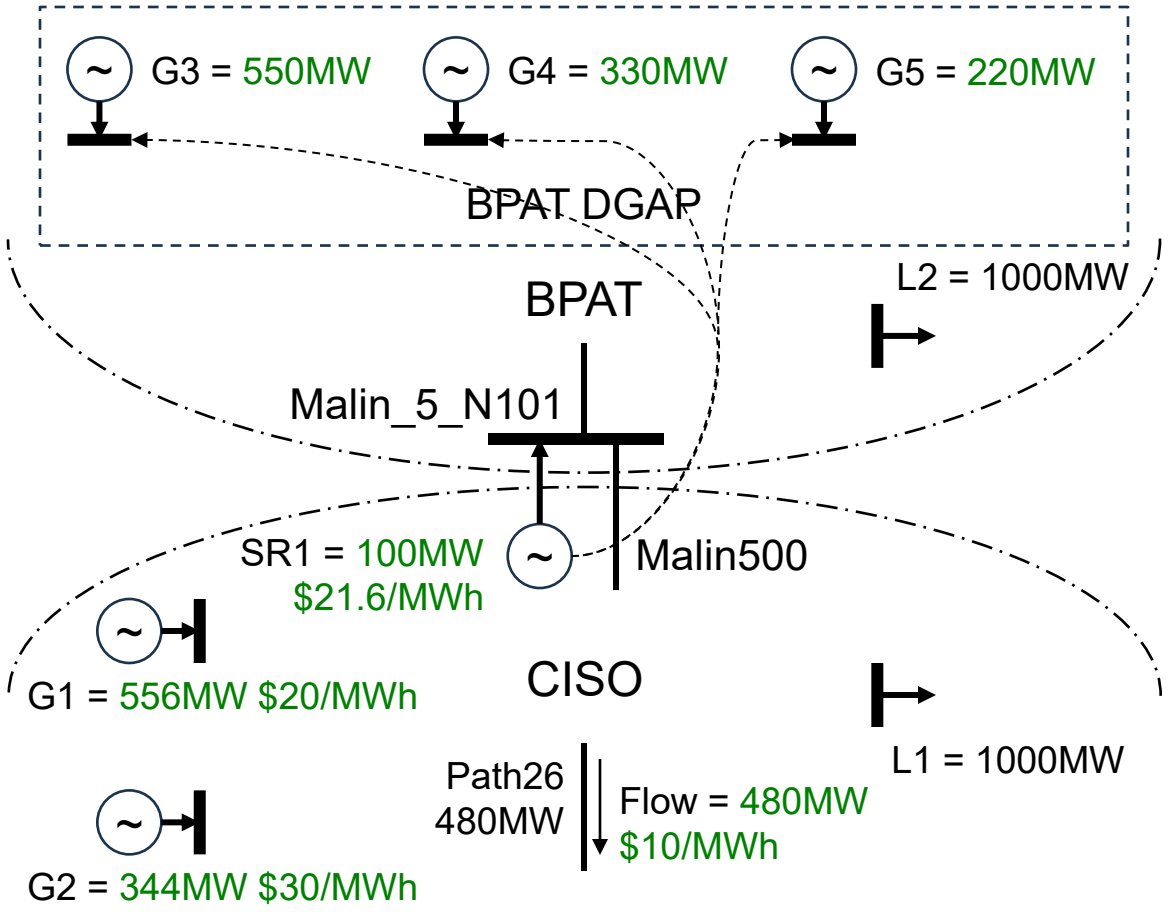
  - Shift Factor to Path26: 0.34
- G1 bids 800MW @ 20/MWh
  - Shift Factor to Path26: 0.5
- G2 bids 600MW @ 30/MWh
  - Shift Factor to Path26: –0.5
- Path26 power flow limit: 480MW

Example for GAP-Tie: BPAT_DGAP-Malin500 IFM Solution (Import)



- SR1 clears for 100MW
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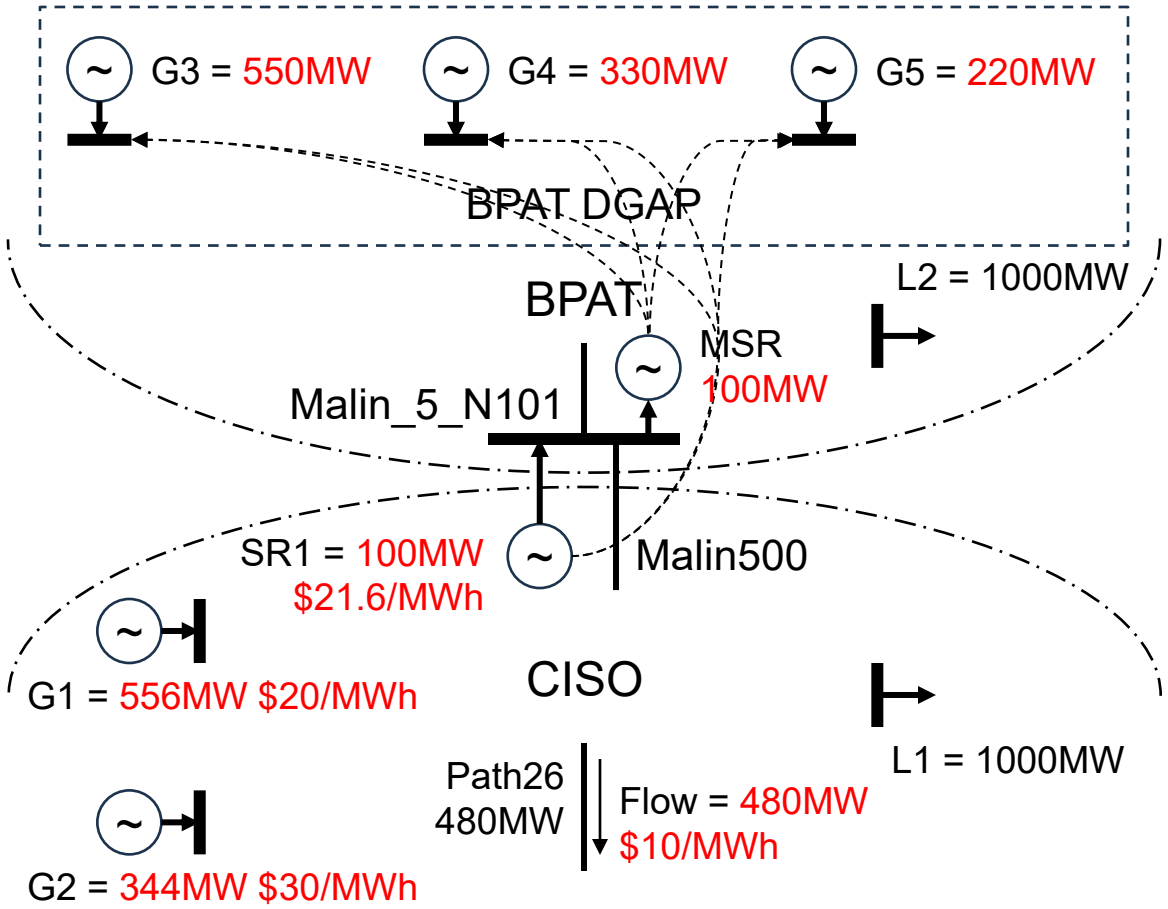
  - PFC to Path26 : 0.5×556 = 278MW
- G2 clears for 344MW
  - PFC to Path26 : –0.5×344 = –172MW
- Path26 power flow:
  - 374 + 278 – 172 = 480MW
- MEC = $25/MWh
- Path26 shadow price = $10/1MWh = $10/MWh
- LMPs:
  - SR1: 25 – 0.34×10 = $21.6/MWh
  - G1: 25 – 0.5×10 = $20/MWh
  - G2: 25 + 0.5×10 = $30/MWh

Example for GAP-Tie: BPAT_DGAP-Malin500 RTM Solution (Import)



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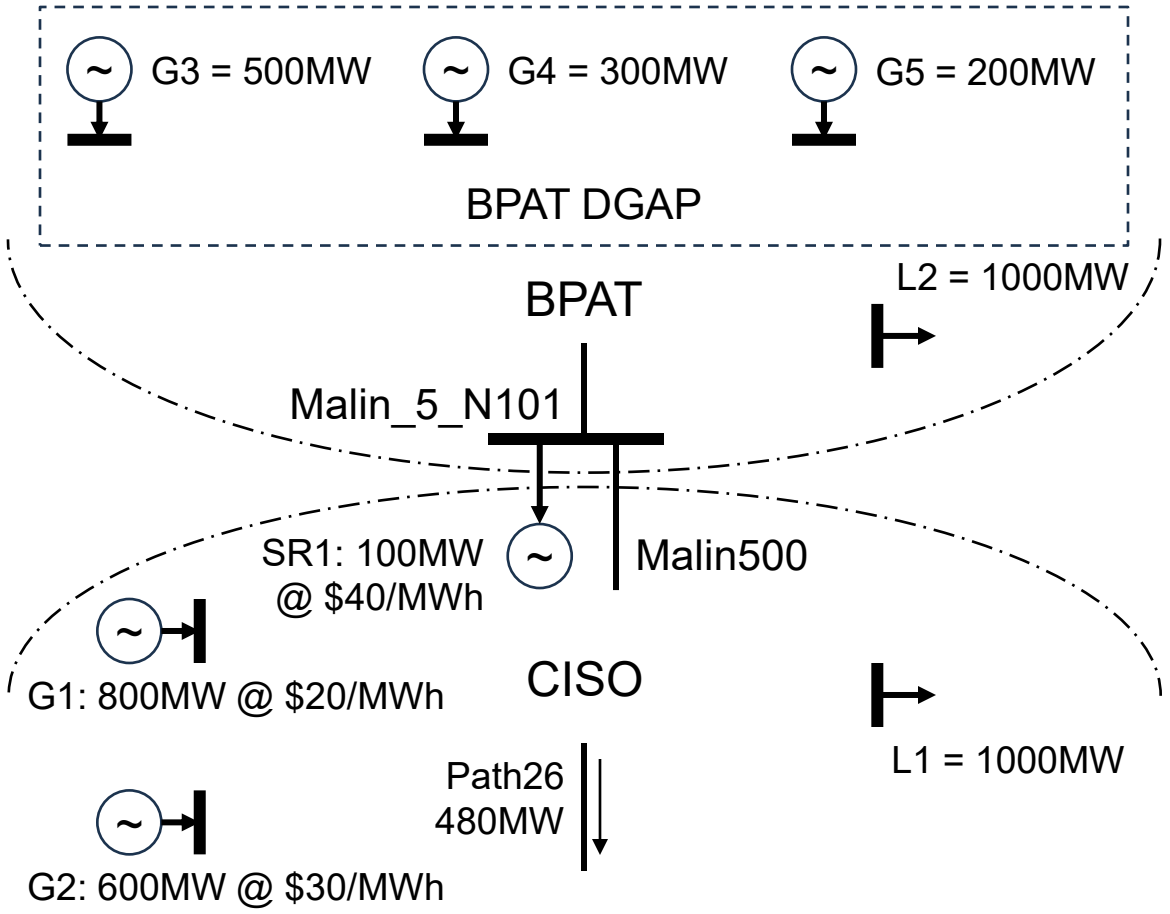
  - G1: 25 – 0.5×10 = $20/MWh
  - G2: 25 + 0.5×10 = $30/MWh

Comparison of existing SP-Tie versus GAP-Tie

- The distribution of the intertie schedule to the GAP results in more realistic power flow in DAM
  - Significant improvement in power flow and market solution accuracy
    - Improved alignment with actual power flow (reduced phantom congestion)
    - RUC results are a better representation of RTM solution
      - No structural difference between DAM and RTM
  - Increased accuracy in congestion management and LMP calculation
  - Reduced need for conforming transmission limits in the market
  - Alignment with EDAM BAA intertie schedules in EDAM, and with EIM BAA intertie schedules in WEIM (non-CAISO BAAs employ GAP-Tie model)

Example for existing SP-Tie: Malin_5_N101-Malin500 Setup (Export)



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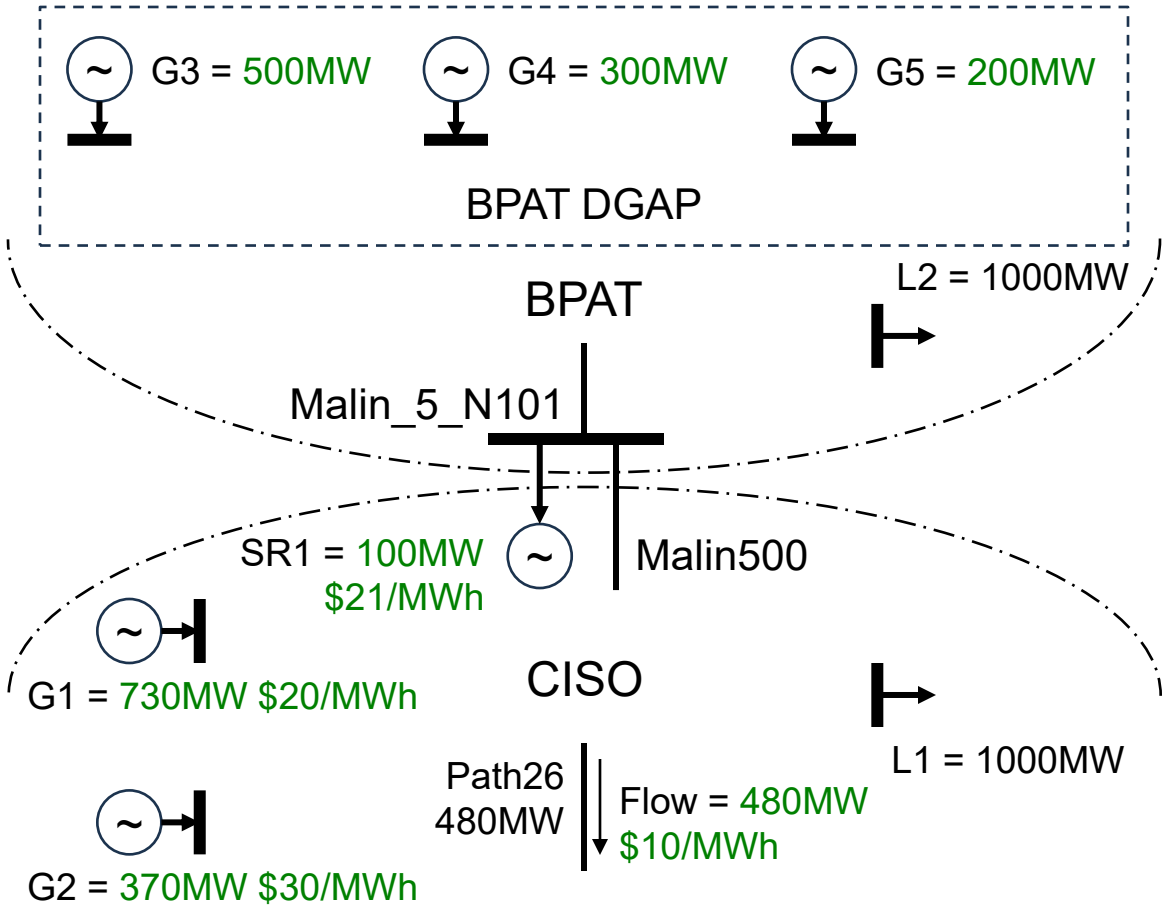
  - Shift Factor to Path26: –0.4
- G1 bids 800MW @ 20/MWh
  - Shift Factor to Path26: 0.5
- G2 bids 600MW @ 30/MWh
  - Shift Factor to Path26: –0.5
- Path26 power flow limit: 480MW

Example for existing SP-Tie: Malin_5_N101-Malin500 IFM Solution (Export)



- BPAT DGAP
  - PFC to Path26: 0.34×1000 = 340MW
- SR1 clears for 100MW
  - PFC to Path26 : –0.4×100 = –40MW
- G1 clears for 730MW
  - PFC to Path26 : 0.5×730 = 365MW
- G2 clears for 370MW
  - PFC to Path26 : –0.5×370 = –185MW
- Path26 power flow:
  - 340 – 40 + 365 – 185 = 480MW
- MEC = $25/MWh
- Path26 shadow price = $10/1MWh = $10/MWh
- LMPs:
  - SR1: 25 – 0.4×10 = $21/MWh
  - G1: 25 – 0.5×10 = $20/MWh
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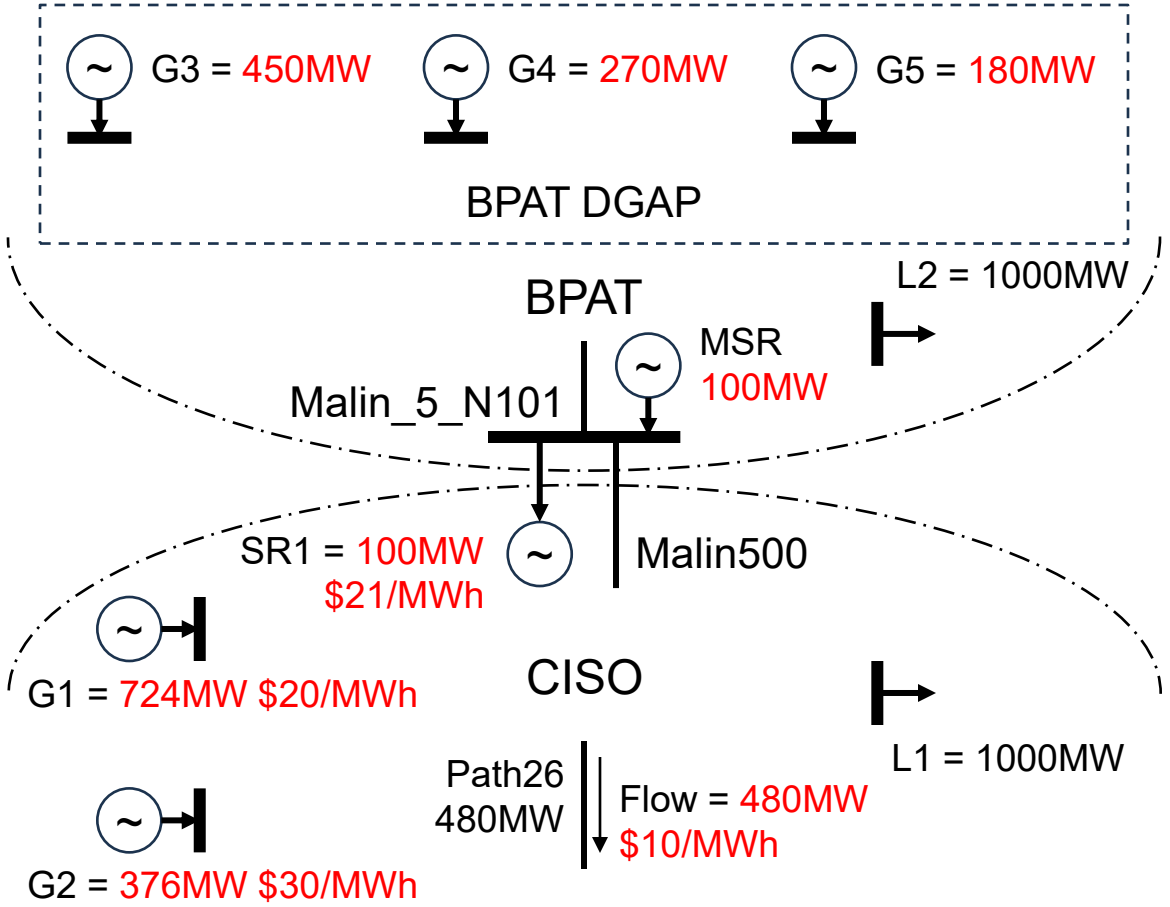
Example for existing SP-Tie: Malin_5_N101-Malin500 RTM Solution (Export)



- BPAT:
  - MSR: 100MW base schedule (cancels SR1 PFC to Path26)
  - G3: 450MW base schedule
  - G4: 270MW base schedule
  - G5: 180MW base schedule
  - PFC to Path26 : 0.34×900 = 306MW
- SR1: 100MW self-schedule
  - PFC to Path26 cancelled by MSR
- G1 clears for 724MW
  - PFC to Path26 : 0.5×724 = 362MW
- G2 clears for 376MW
  - PFC to Path26 : –0.5×376 = –188MW
- Path26 power flow:
  - 306 + 362 – 188 = 480MW
- MEC = $25/MWh
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- LMPs:
  - SR1: 25 – 0.4×10 = $21/MWh
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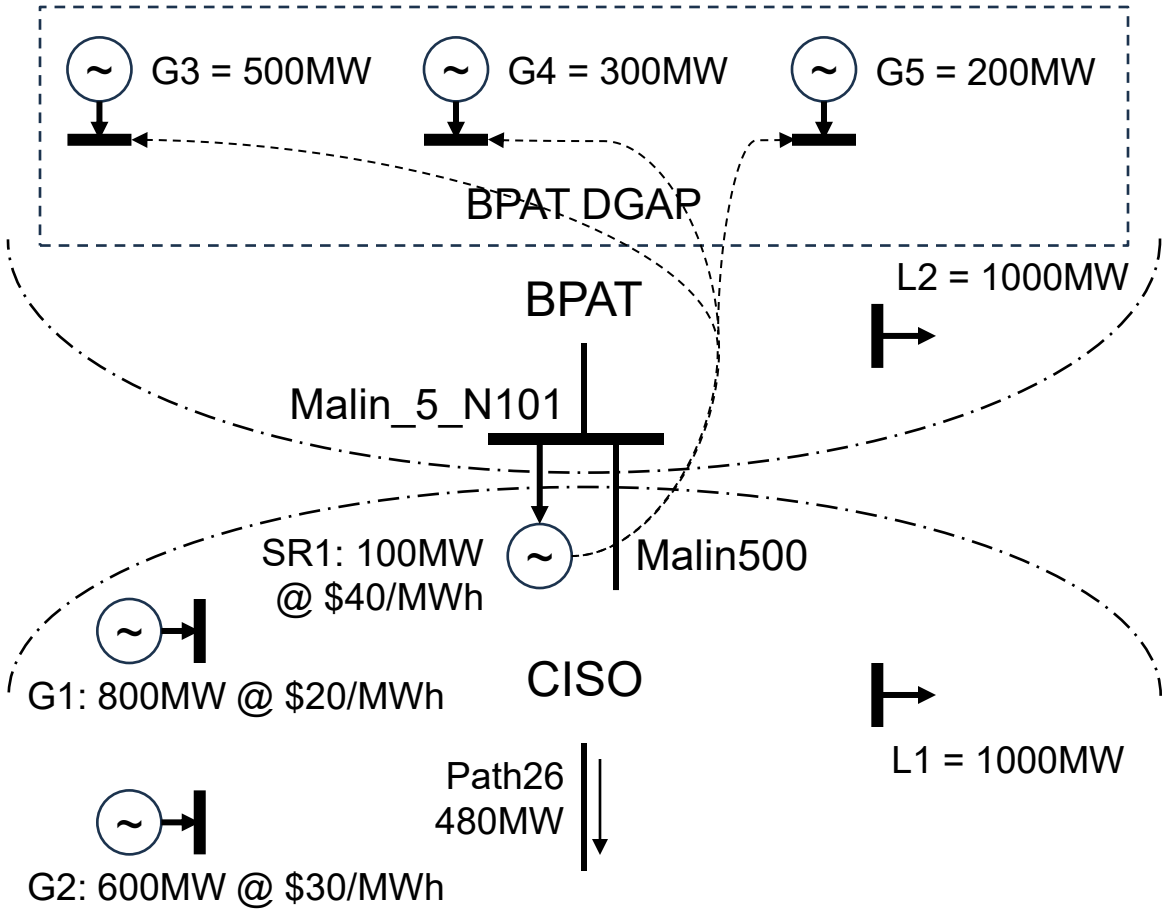
Example for GAP-Tie: BPAT_DGAP-Malin500 Setup (Export)



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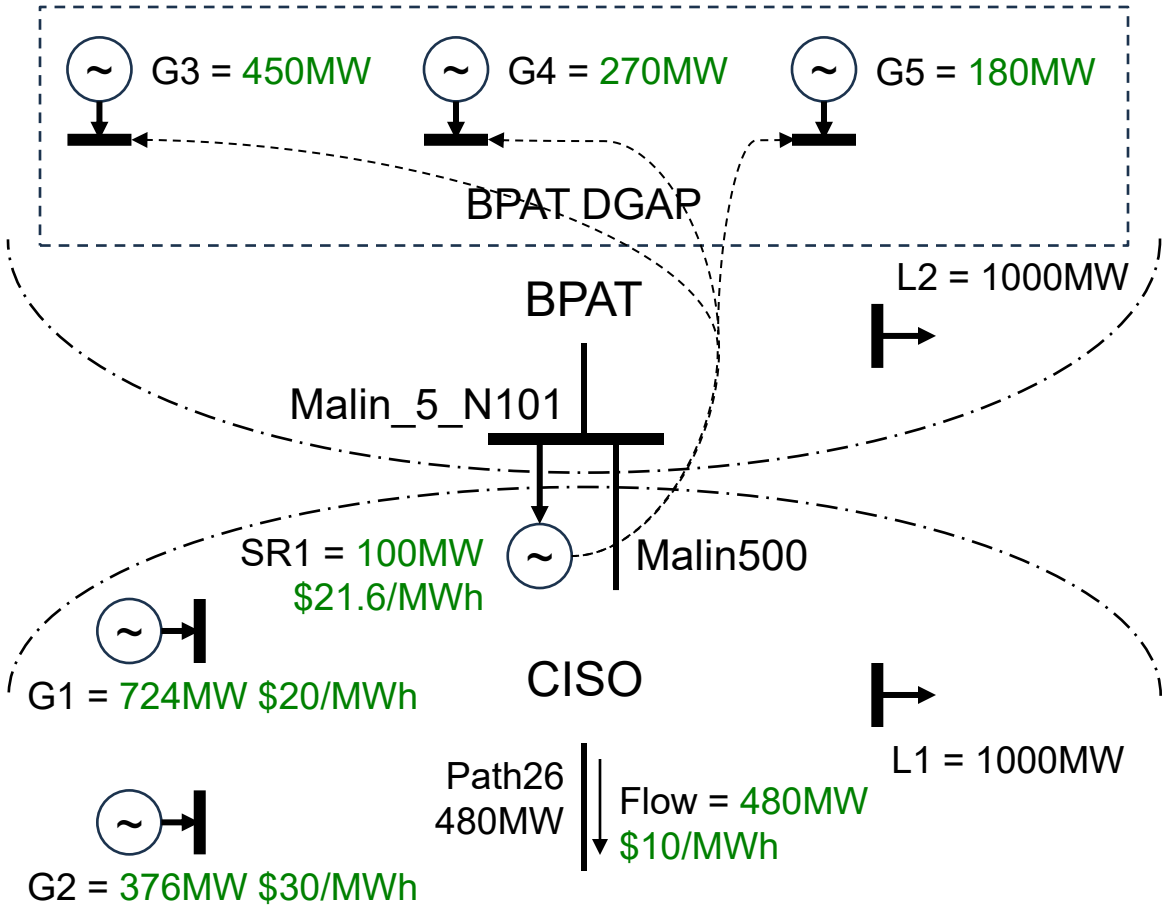

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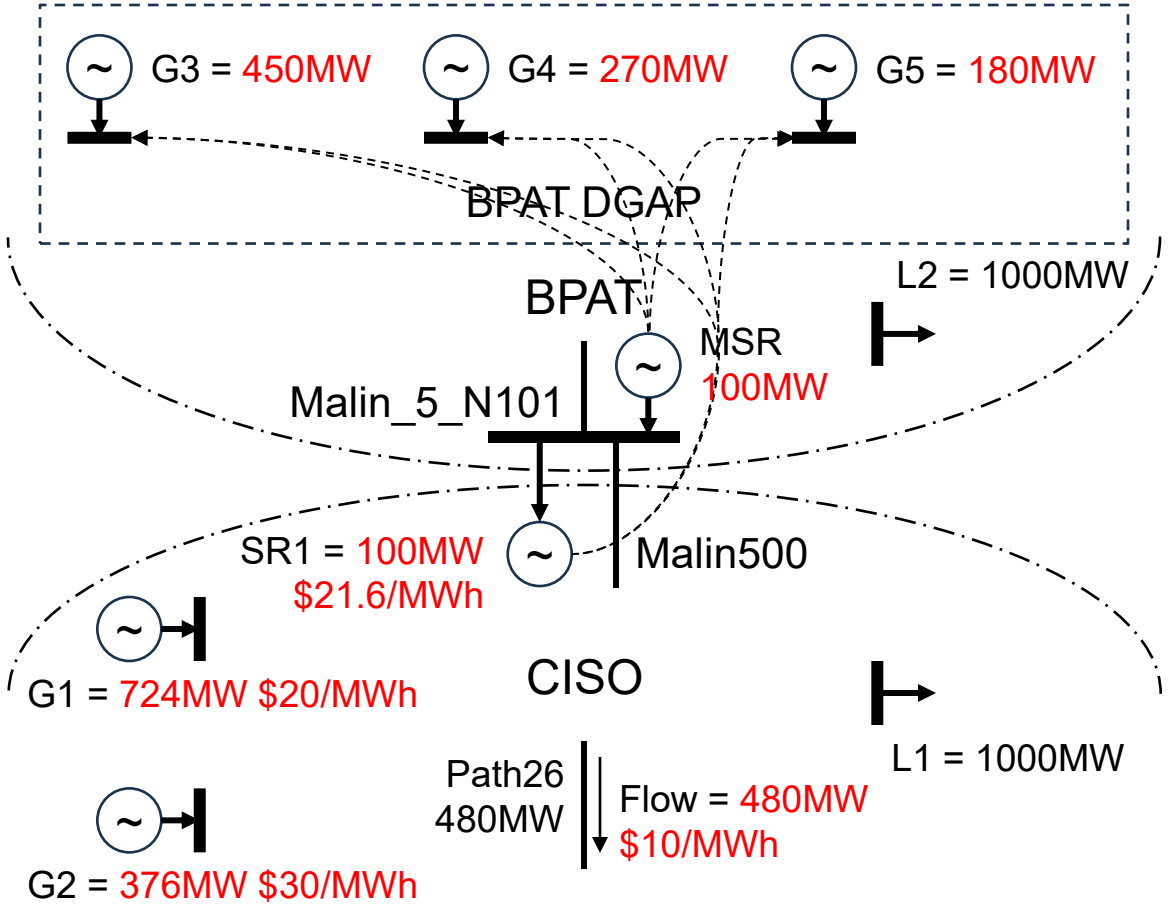

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Upcoming Workshops

- ***April 2026 workshop***
  - Continue with educational components and stakeholder questions
  - Transactions at EDAM internal interties
  - Resource Adequacy (RA) import deliveries under GAP-Tie design
  - Alignment with Congestion Revenue Rights (CRR) under GAP-Tie modeling
  - Identification of potential policy design issues or topics to consider

- ***May 2026 workshop***
  - Continue with discussion on aspects from prior workshops
  - Discuss any resulting policy design issues or topics that may have been identified through prior workshops

- Stakeholder comments on today's workshop are due on **April 1, 2026**.

This Week at the ISO – 3/16/26

Stakeholder Meetings

All public stakeholder meetings are also listed on the CAISO Calendar

- Monday, March 16th - Storage Design and Modeling
  - 9:00am – 12:00pm PT (link)
- Monday, March 16th - WEM Regional Issues Forum
  - 1:00pm – 4:00pm PT (link)
- Tuesday, March 17th - Interconnection Customer User Group
  - 1:00pm – 2:00pm PT (link)
- Wednesday, March 18th - Intertie Schedule Modeling Evolution on CAISO Interties: Workshop on 3/18/26
  - 1:00pm – 5:00pm PT (link)
- Thursday, March 19th - Market Update
  - 10:00am – 10:30am PT (link)
- Thursday, March 19th – Financial Planning Initiatives (including Start-up Funding for the Regional Organization for Western Energy).
  - 1:30pm – 3:30pm PT (link)

Comment Submission Deadlines

- Monday, March 16th – Interconnection Process Enhancements Revised Final Proposal
- Tuesday, March 17th – BPM Proposed Revision Requests (PRRs) 1660 - 1667

- **Trainings** .
- Thursday, March 19th - Scheduling Infrastructure and Business Rules (SIBR) Advanced Bid Submission and Validation
  - 9:00am – 11:00am PT (registration required - link)

This Week at the ISO continued

Market Simulations

- Please refer to our Release Schedule for the most recent updates of initiatives scheduled for MAP- and Production- stage market sims
- Monday, March 16th – Parallel Operations - DAME, EDAM, EDAM CAISO Balancing Authority Area Participation Rules Market Simulation and Parallel Ops Meeting
  - 9:00am – 10:00am PT (link)
- Thursday, March 19th – Parallel Operations - DAME, EDAM, EDAM CAISO Balancing Authority Area Participation Rules Market Simulation and Parallel Ops Meeting
  - 1:00pm – 2:00pm PT (link)

To participate in the DAME and EDAM Implementation pre-Market Simulation meeting series, please follow these steps:

Submit a CIDI Request:

- Log in to the CAISO Customer Inquiry, Dispute, and Information (CIDI) system.
- Create a new request with the 'Functional Environment' set to "Market Simulation."
- In the request, specify your intent to participate in the DAME & EDAM Market Simulation.
- Include the following information:
  - Market Simulation initiative(s) you will participate in.
  - Any specific resources or systems you plan to test.
  - Contact names and email addresses for coordination.

Email Option:

- If you do not have access to CIDI, you may send an email to marketsim@caiso.com with the subject line "DAME & EDAM Market Simulation Registration.“

Business Practice Manual (BPM) Updates

- The status of all PRRs and updated BPMs in the BPM Library are published on the BPM Change Management Website.

Energy Matters blog provides timely insights into ISO grid and market operations as well as other industry-related news.

https://www.caiso.com/about/news/energy-matters-blog

Story | Markets

Two new entities will join the WEIM in May, extending market footprint to a 12th Western state

02/25/2026

Story | Leadership

A CAISO perspective on seams

By Elliot Mainzer

02/23/2026

Story | Inside the California ISO

Parallel Operations: another milestone on the way to EDAM "Go Live"

By Dr. Khaled Abdul-Rahman

02/11/2026

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