

California Independent

System Operator Corporation

**For Discussion Purposes Only**

**ILLUSTRATIVE DRAFT LANGUAGE TO BE INCLUDED IN THE BUSINESS PRACTICE**

**MANUAL FOR FULL NETWORK MODEL**

 Below are illustrative changes that the CAISO intends to make to the Business Practices Manual for the Full Network Model in order to incorporate additional detail and terminology changes associated with the modeling of Integrated Balancing Authority Areas (“IBAAs”). This language is based on the work papers the CAISO has previously distributed in developing the descriptions of its modeling of IBAAs. The CAISO notes that additional changes may be required to other Business Practice Manuals (“BPMs”) to ensure that all BPMs also reflect the detail described below. In addition, the actual changes in the BPM for FNM will appear in the next version of the BPM that is released.

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1. **BPM For FNM Excerpt on Integrated Balancing Authority Area**

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### 4.2.6 Integrated Balancing Authority Areas

The FNM includes models for a number of other Balancing Authority Areas to properly manage congestion within the CAISO network. The following two sections discuss the background for how the various Balancing Authority Areas that are in the FNM are handled and discuss the approach to modeling these Balancing Authority Areas.

The relationship of Integrated Balancing Authority Areas (IBAAs) to the FNM is described in Section 27.5.3 of the CAISO Tariff. Pricing for Scheduling Points associated with IBAAs is also described

CAISO Tariff Appendix C (Section G).

Presently, the FNM includes the following external Balancing Authority Areas as IBAAs. These are Balancing Authority Areas that have transmission facilities operating in parallel with the CAISO Balancing Authority Area, are closely interconnected to the CAISO Balancing Authority Area, and therefore affect physical flows within the CAISO Balancing Authority Area:

* Sacramento Municipal Utility District (SMUD) including the transmission facilities of the following entities:
* Western Area Power Administration (WAPA) – Sierra Nevada Region
* Modesto Irrigation District (MID)
* City of Redding
* City of Roseville
* Turlock Irrigation District (TID)

Additional IBAAs may be modeled after the initial implementation of the FNM as transmission facilities that are closely interconnected to and operate in parallel with the CAISO Balancing Authority Area, and that therefore affect physical flows within the CAISO Balancing Authority Area, as discussed below. In the event that other Balancing Authority Areas are modeled as IBAAs, the CAISO will change this BPM according to the Business Practice Manual for Change Management to reflect the updated IBAAs. The CAISO’s Reliability model includes a model for these Balancing Authority Areas’ high voltage physical networks.[[1]](#footnote-1) The CAISO will determine the extent to which its market network applications can provide functionality to price services within the CAISO Balancing Authority Area and at its Scheduling Points, consistent with scheduling practices and policy agreements among Balancing Authority Areas.

**4.2.6.1 Background**

The design of MRTU recognizes that the CAISO Balancing Authority Area is interconnected with several other Balancing Authority Areas in the Western Electricity Coordinating Council (WECC) interconnected system. Traditional methods of interactions between Balancing Authority Areas consist of managing contractual deliveries at intertie Scheduling Points between Balancing Authority Areas.

Having an accurate network model within the CAISO Balancing Authority Area, and in neighboring Balancing Authority Areas whose networks are closely interrelated with the CAISO’s and therefore affect physical flows within the CAISO Balancing Authority Area, is essential for MRTU to achieve its objectives. For example, the CAISO’s network is so closely linked to the SMUD and TID Balancing Authority Areas’ networks that assuming that their contractual deliveries to and from the CAISO Balancing Authority Area are actually located at the Scheduling Points would lead to erroneous congestion management results by the CAISO: the CAISO would fail to recognize some congestion until real-time, when its options are limited for managing the congestion, while some congestion could appear to be present during Day-Ahead scheduling but not materialize in Real-Time because the physical injections had not actually been at the Scheduling Points.

Such areas are referred to in the MRTU design as IBAAs.

The initially modeled IBAAs are Balancing Authority Areas that have more than one direct interconnection with the CAISO Balancing Authority Area, and for which the CAISO has determined that (1) Congestion Management within the CAISO would be adversely affected if they are not modeled in detail and (2) modeling as IBAAs will significantly improve Congestion Management within the CAISO..

The IBAA concept was originally developed to address the modeling of the SMUD system, and was later expanded to include WAPA (Sierra Nevada region) when WAPA joined the SMUD Balancing Authority Area. The SMUD Balancing Authority Area is now directly interconnected with BPA through the California-Oregon Transmission Project (COTP), in addition to interconnections with the CAISO and TID Balancing Authority Areas. The Imperial Irrigation District (IID), which is also interconnected with Arizona Public Service, and the Los Angeles Department of Water and Power (LADWP), which has several interconnections, also have the characteristics of an IBAA and may be modeled as such after the initial implementation, after the CAISO completes an analysis of the IID and LADWP systems and determines the availability of the required State Estimator solutions and other necessary information. Other areas may be added as the CAISO develops sufficient modeling information.

Conditions within IBAAs cannot be ignored in the FNM, as is currently the case with external Balancing Authority Areas, because their transmission network is embedded in and/or runs in parallel with major parts of the CAISO network, thus having significant impact in the operation of the CAISO grid. Loop flow through the IBAAs is significant and has a large impact on the optimal resource scheduling and the Locational Marginal Prices (LMPs) in the CAISO’s MRTU Market. Furthermore, accurate contingency analysis requires an accurate model for IBAAs. For these reasons, IBAAs must be modeled accurately in the FNM, which presents several challenges, not only in the market applications and information systems, but also in the coordination of scheduling information between the IBAAs and the CAISO.

**4.2.6.2 Modeling Approach**

The CAISO has the capability to implement alternative methodologies for modeling IBAAs. The specific IBAA modeling is subject to the CAISO obtaining the requisite modeling and pertinent information. The CAISO will work with other Balancing Authority Areas to obtain the requisite information, some of which may be confidential. When the CAISO has secured the required detailed scheduling and operational data, the CAISO can support the following principles for modeling of IBAAs:

* Integrated Balancing Authority Areas, their detailed transmission systems, Generators and Loads are modeled in the FNM.
* CAISO State Estimator solves for the state of the IBAAs.
* Net Interchange values for IBAAs are available at CAISO.
* IBAA may have multiple interchange points with CAISO. Integrated Balancing Authority Areas and/or may have multiple interchange points with other Balancing Authority Areas.
* IBAA may participate in the CAISO Markets on a resource-specific basis. As appropriate, it may be sufficient that scheduling be done by using aggregations of resources rather than scheduling all resources individually.
* IBAA Generation or Demand may schedule dynamic transfers with or wheeling schedules through the CAISO Balancing Authority Area.
* IBAA system internal transmission constraints are monitored but will not be enforced (unless the CAISO and IBAA agree otherwise) by CAISO market system. (The mechanism for enabling the ability to monitor but not necessarily enforce constraints is the FNM Exception List.)[[2]](#footnote-2)
* IBAA system losses are calculated and stored in database separate from the loss values of CAISO to enable the CAISO to dispatch CAISO resources based solely upon conditions within the CAISO system.
* The effect of IBAA transmission systems is excluded from CAISO loss sensitivity calculations and LMPs.
* The Load and Generation pattern in the Forward Markets is obtained by scaling the Load and Generation according to Intertie Distribution Factors to meet the Load and net-interchange values between the IBAA and external Balancing Authority Areas.

When less detailed scheduling and operational data are available, the CAISO can support simplified approaches to modeling of IBAAs. The CAISO may use a reduced network model that provides the detail that is necessary for modeling of the interaction between the CAISO and IBAA networks without revealing confidential operational data of the IBAA. If IBAA resources do not participate in the CAISO Markets on a resource-specific basis, the CAISO will establish areas in which all IBAA resources (supply and demand) are modeled as aggregations of pseudo-injections at central points in the IBAA’s high voltage network. In the Day-Ahead Market, the CAISO would assume that Schedules have their source or sink at these resource aggregations. If a State Estimator solution is available to the market systems in the Real-Time Market, the CAISO would see the actual locations of supply and demand in the IBAA, and only incremental Dispatch would be treated as pseudo-injections.

If the confidentiality of real-time operational data for an IBAA precludes basing the CAISO’s Real-Time Market solution on a State Estimator solution for its area, the CAISO has the ability to estimate the pseudo-injections within the IBAA at levels that produce flows at the CAISO boundary that match the flows that are observed in the CAISO’s telemetry. This calculation approach uses the same methodology as estimating pseudo-injections in New PTO network, as described in Section 4.2.4.3. However, it must be recognized that the calculated pseudo-injections are simply an approximation of conditions in the IBAA, and such an approximation is likely to less valid for future Dispatch Intervals than if a State Estimator solution were available.

The detailed manner in which modeling is handled for any particular IBAA will be determined after discussion with the affected BAA and analysis of the requisite information. The pertinent details will be documented in an appendix to this BPM.

**4.2.6.3 CAISO Process for Establishing or Modifying IBAAs**

Prior to implementing a new, or modifying an existing, Integrated Balancing Authority Area, the CAISO will:

1. Consult with all affected Balancing Authority Areas, Market Participants and interested stakeholders regarding appropriate changes to the defined IBAAs or the creation of new IBAAs and the appropriate pricing and settlement treatment of the new or modified IBAA;
2. To the extent the extent necessary, file all necessary and appropriate changes to the CAISO Tariff regarding the proposed or modified defined IBAAs at the FERC.
3. To the extent necessary, 1) change the BPM for FNM detail to reflect the modeling specifications for the new IBAA and will add a new Appendix to the BPM for FNM to reflect the specifications for the new IBAA, or 2) in the case of a modification of an existing defined IBAA, the CAISO will modify the existing BPM for FNM language to reflect any changes;

The CAISO’s IBAA consultation process will include discussion of appropriate modifications to the CAISO’s FNM to enable the CAISO to accurately model the impact of power flows on the proposed or modified IBAA’s system on the CAISO Controlled Grid for power flow calculations and congestion management in the CAISO Markets Processes. Appropriate modifications to the CAISO FNM include, among other factors, transmission network topology, the location of Generation and Load on the IBAA system, distribution factors, the identification of operationally relevant sub-systems within each IBAA, and other information detailed in Section 4.2.6.2 above.

The CAISO’s IBAA consultation process will also include the discussion of the appropriate PNodes or APNodes for the proposed or modified IBAA, the weighting factors for determining the average price of the nodes where System Resources have been modeled in the IBAA, the need to create prices for each operationally relevant sub-system within the IBAA, and the manner by which the CAISO will exclude the marginal transmission losses within the IBAA from affecting the prices within the IBAA and the CAISO.

The CAISO will also conduct stakeholder meetings to discuss the new implementation of the IBAA or the modifications to the existing IBAA. In addition, the CAISO will provide notice regarding any affected BPM changes pursuant to the BPM Change Management process as reflected in the BPM for Change Management. Any necessary tariff changes will also be vetted with participants pursuant to the normal CAISO tariff language stakeholder process.

To the extent practicable, the process described above will be applied and completed, with a minimum 60-day notification prior to implementing or filing any tariff changes for a new IBAA or modifying an IBAA. In addition, the CAISO will endeavor to issue such notification prior to the start of the Annual CRR Allocation and Auction process.

**Appendix to Business Practice Manual for
Managing Full Network Model**

**MRTU Release 1 Implementation of
Sacramento Municipal Utilities District and
Turlock Irrigation District Balancing Authority Areas as
Integrated Balancing Authority Areas**

[Note – while this is not shown in redline, this would be a new appendix in its entirety.]

### Introduction

As provided in Section 27.4.3 of the CAISO Tariff and in Section 4.2.6 of the BPM for FNM, a key feature of the CAISO Markets for enhancing reliability and increasing the efficient utilization of the transmission system is the development and application of a detailed and accurate Full Network Model (“FNM”), including the modeling of Balancing Authority Areas that most directly impact the CAISO’s Congestion Management as Integrated Balancing Authority Areas (“IBAA”).[[3]](#footnote-3)

Currently, the CAISO is able to implement the Sacramento Municipal Utility District (SMUD, including the Western Area Power Administration, Modesto Irrigation District, and municipal utilities that are connected to these entities’ transmission systems) and Turlock Irrigation District (“TID”) Balancing Authority Areas as IBAAs. This appendix describes the methodology for modeling these areas. Additional IBAAs will be implemented pursuant to the procedures described in Section 4.2.6 of the BPM for FNM.

Further background information on the modeling of IBAAs in MRTU Release 1 is available in two discussion papers: (1) “Modeling and Pricing Integrated Balancing Authority Areas Under the California ISO’s Market Redesign and Technology Upgrade Program” (<http://www.caiso.com/1cb4/1cb4e1a154060.pdf>) and (2) “MRTU Release 1 Implementation of Preferred Integrated Balancing Authority Area Modeling and Pricing Options” (<http://www.caiso.com/1cb4/1cb4e0984a670.pdf>).

### Modeling Approach

The modeling approach described herein recognizes the flow interactions that occur between the CAISO and the SMUD and IID IBAA networks by relying on a limited but readily available set of information, and utilizing a simplified or equivalent model of the actual IBAA network. Nevertheless, the IBAA model fully represents and recognizes the interconnections and associated intertie constraints with the CAISO such that parallel flow effects are addressed in the Day-Ahead and Real-Time Markets. Under this modeling approach, rather than modeling physical resources internal to these IBAA networks, the physical sources and sinks are abstracted using individual or aggregations of System Resource injections located at dominant transmission bus locations within the IBAA network. These locations within the IBAA network are based on where generation from remote locations feeds into and/or load is ultimately served via lower level distribution stations. Individual and aggregate System Resources distribute and model import and export transactions between the CAISO and the IBAA Balancing Authority Areas.

The SMUD and TID IBAAs are electrically connected to the CAISO at several boundary Scheduling Points, and contain generation and load resources at a number of locations. The CAISO will predefine Resource Identifiers (Resource IDs) that associate the Scheduling Points at the CAISO/IBAA boundaries with individual or aggregate System Resources that the CAISO models at major junctions within the IBAAs, near IBAA generation and/or load.[[4]](#footnote-4) Import and export Schedules will be distributed within the IBAAs, and at the Captain Jack intertie, using predetermined Intertie Distribution Factors to aggregated System Resources. Refer to Figure 1 and 2 for conceptual illustrations of the SMUD/WAPA IBAA model. The definition of these aggregated System Resources is as follows:[[5]](#footnote-5)

**Table 1: Definition of System Resource Aggregations for SMUD/WAPA/MID and TID IBAAs**

|  |  |
| --- | --- |
| **Aggregated System Resource** | **Imports to or Exports from CAISO** |
| **Bus** | **Intertie Distribution Factor** |
| **SMUD Hub** | **37005\_ELVERTAS 230kV** | **0.14** |
| **37010\_HURLEY S 230kV** | **0.31** |
| **37012\_LAKE 230kV** | **0.19** |
| **37016\_RNCHSECO 230kV** | **0.36** |
| **WAPA Hub** | **37545\_COTWDWAP 230kV** | **0.76** |
| **37548\_FOLSOM 230kV** | **0.07** |
| **37585\_TRCY PMP 230kV** | **0.17** |
| **MID Hub** | **38204\_PRKR MID 230kV** | **1.00** |
| **TID Hub** | **38400\_WALNT 230kV** | **1.00** |
| **Roseville Hub** | **37567\_ROSEVILL 230kV** | **1.00** |
| **Captain Jack Intertie** | **45035\_CAPTJACK 500kV** | **1.00** |

The CAISO will establish Resource IDs for each combination of Scheduling Points and individual or aggregate System Resources that is being scheduled. Multiple Resource IDs may exist in the CAISO Markets at each intertie Scheduling Point, and each will be mapped to a predefined set of System Resources. The predefined aggregation of System Resources that is mapped for some Resource IDs at any Scheduling Point may differ from the System Resources that are mapped for other Resource IDs at the same Scheduling Point, as illustrated in Figure 1. The default presumption in establishing Resource IDs is that the individual or aggregate System Resource represents supply that is controlled by the transmission owner for the boundary Scheduling Point, for which the CAISO will determine appropriate Intertie Distribution Factors, or is an import from another Balancing Authority Area at Captain Jack for which the CAISO will receive E-Tags for the interchange transactions. The default mapping of Resource IDs is shown in Table 2.

**Table 2: Default Association of Scheduling Points to System Resource Aggregations for SMUD/WAPA/MID and TID IBAAs**

|  |  |  |
| --- | --- | --- |
| **Scheduling Point** | **Default Resource Identification** | **Aggregated System Resource** |
| **37012\_LAKE 230kV** | **LAKE\_2\_GOLDHL** | **SMUD Hub** |
| **LAKE\_2\_CAPJAK** | **Captain Jack Intertie** |
| **37016\_RNCHSECO 230kV** | **RANCHO\_2\_BELOTA** | **SMUD Hub** |
| **RANCHO\_2\_CAPJAK** | **Captain Jack Intertie** |
| **30035\_TRACY 500kV** | **TRACY5\_5\_PGAE** | **WAPA Hub** |
| **TRACY5\_5\_ROSVIL** | **Roseville Hub** |
| **TRACY5\_5\_COTP** | **Captain Jack Intertie** |
| **TRACY5\_5\_CAPJAK** | **Captain Jack Intertie** |
| **37545\_COTWDWAP 230kV** | **CTNWDW\_2\_CTTNWD** | **WAPA Hub** |
| **CTNWDW\_2\_RNDMTN** | **WAPA Hub** |
| **CTNWDC\_2\_CAPJAK** | **Captain Jack Intertie** |
| **CTNWDR\_2\_CAPJAK** | **Captain Jack Intertie** |
| **37563\_MELONES 230kV** | **MELONP\_2\_PGAE** | **New Melones Pseudo-Tie** |
| **33574\_LLNL 115kV** | **LLNL\_1\_TESLA** | **WAPA Hub** |
| **LLNL\_1\_CAPJAK** | **Captain Jack Intertie** |
| **37582\_TRACY YG 69kV** | **Not used for scheduling** |
| **37585\_TRCY PMP 230kV** | **TRCYPP\_2\_TESLA** | **WAPA Hub** |
| **TRCYPP\_2\_CAPJAK** | **Captain Jack Intertie** |
| **30670\_WSTLYSMD 230kV** | **WESTLY\_2\_TESLA** | **MID Hub** |
| **WSTLYM\_2\_CAPJAK** | **Captain Jack Intertie** |
| **38229\_STANDFD2 115kV** | **STNDFD\_1\_STNCSF** | **MID Hub** |
| **STNDFD\_1\_CAPJAK** | **Captain Jack Intertie** |
| **38402\_WSTLYTID 230kV** | **WESTLY\_2\_LOSBNS** | **TID Hub** |
| **WSTLYT\_2\_CAPJAK** | **Captain Jack Intertie** |
| **38432\_OAKDLTID 115kV** | **OAKTID\_1\_OAKCSF** | **TID Hub** |
| **OAKTID\_1\_CAPJAK** | **Captain Jack Intertie** |

The CAISO will evaluate requests from Scheduling Coordinators for other combinations of individual or aggregate System Resources and Scheduling Points, and assign the Resource ID for the SC along with appropriate Intertie Distribution Factors. Such requests will be evaluated based on legitimate need and the CAISO may require data to be submitted by the requesting entity in order to verify the appropriateness of assignment and use of the Resource ID. The CAISO will then expect that the Resource IDs are being correctly associated with supply or demand at the designated locations (including aggregated locations, such as subsystems of an IBAA), and will monitor compliance with the definitions of the Resource IDs.

A generation owner in the IBAA may choose to designate a specific resource for participation in the CAISO Markets by opting to register the resource as a Dynamic Resource-Specific System Resource or a Non-Dynamic Resource-Specific System Resource, or a pseudo tie.[[6]](#footnote-6) The IBAA modeling approach continues to allow this possibility and any Resource-Specific System Resource or pseudo ties would be distinguished from being part of an aggregated System Resource. If a generation owner establishes a Resource-Specific System Resource, the CAISO will not include its capacity in another aggregation, and the Intertie Distribution Factors for the remaining aggregated System Resource would be adjusted to reflect the remaining generation. A Resource-Specific System Resource would be settled at its LMP and not the IBAA aggregate price. A Resource-Specific System Resource will need to provide sufficient information including telemetry to allow the CAISO to monitor its compliance with the CAISO’s Dispatch Instructions, including Schedules, at its specific location. At this time, no Resource-Specific System Resource has been requested in the SMUD and TID IBAAs.

The CAISO’s definitions include a separate System Resource for Roseville because Roseville’s status as a Scheduling Coordinator (SC) makes it feasible to identify its Schedules. Other specific entities could be similarly identified if Resource IDs are established to ensure which specific physical locations are being served.

### IBAA Pricing and Settlement Approach

The CAISO’s pricing and settlement approach supports and aligns the settlement of transactions between the IBAAs and the CAISO with the operational reality of the system, by pricing transactions based on a single or aggregate locational price that uses the same location(s) where the transactions are being sourced or sunk within the IBAA, as shown in Table 1. In cases where the IBAA represents a single Balancing Authority (*e.g.,* TID), the CAISO uses a single aggregate IBAA price based on the weighted average price of the nodes where System Resources have been modeled in the IBAA. For an IBAA, such as the SMUD IBAA, that represents an aggregation of individual sub-systems that operate with their own balancing responsibility, the CAISO establishes aggregate prices for each operationally relevant sub-system, based on the weighted average price (using the Intertie Distribution Factors) of the System Resources that are used to distribute transactions from the sub-system within the IBAA. This establishes a “hub” price for the different operational sub-system areas within each IBAA.

When a Scheduling Point at the CAISO/IBAA boundary is associated with multiple individual or aggregate System Resources within the IBAA, the CAISO’s price for the different Resource IDs could be different from the same Scheduling Point, to reflect the value to the CAISO of injections at their own aggregations of System Resources. When the same aggregation of System Resources is mapped from multiple Scheduling Points, the value to the CAISO system due to injections from the aggregation of System Resources would be the same, regardless of which intertie Scheduling Point is used, and the CAISO’s price would be the same. Scheduling Coordinators are required to provide accurate information to the CAISO, as provided in the CAISO Tariff, when registering the linkage between System Resources to Resource IDs to ensure realistic identification of the set of System Resource injections that support their Schedules.

Different prices for the separate hubs in the proposed pricing approach may create the potential for undesirable arbitrage opportunities among price differences between the different hub prices. To mitigate these undesirable opportunities, some monitoring and mitigation measures may be deployed under this pricing approach. For example, monitoring measures may include analysis of available telemetry and E-Tag data to ensure that a delivered transaction is indeed being sourced from the System Resource(s) that are associated with the scheduled interchange transaction. Other monitoring of the proposed pricing approach may be deployed to identify circular scheduling behavior that is being sourced and sunk in the same IBAA to take advantage of price differences of the different sub-system hub prices within the same IBAA. Other Balancing Authority Areas settlement, such as settlement of inadvertent interchange (deviations between actual and scheduled interchange), will occur as it does currently and is not affected by the IBAA modeling or pricing approach.

### IBAA and Congestion Revenue Rights (CRRs)

The amount of Congestion cost that will be charged in the Day-Ahead Market for Schedules to or from an IBAA will be consistent with the pricing approach described above. Settlement of CRRs will pay the CRR Holder on the same basis for Schedules to or from an IBAA as these Schedules are charged for Congestion in the Day-Ahead Market. The same System Resource pricing aggregation(s) will be used for CRR Settlements as are used in the Day-Ahead Market, so CRR Settlement will be consistent with the resource locations that are used for Settlement of the IBAAs’ Congestion costs.

**Figure 1:**

**Implementation Concepts for Scheduling Intertie Resources
in Integrated Balancing Authority Area Modeling Approach**

Note: MID and TID are not shown in this diagram in the interest of avoiding further complexity

A generation owner in the IBAA can establish a Resource-Specific System Resource. SMUD has expressed interest in bidding the Cosumnes power plant separately from the aggregated SMUD System resource.

Schedules can also be established to serve Scheduling Point/ System Resources pairs other than the default, e.g., SMUD uses ETCs through CAISO for contract delivery at Tracy, to serve SMUD load. Establishing these non-default pairs will involve validation of the physical resources.

Folsom, Roseville

Captain Jack intertie: Wheeling Schedules at Captain Jack are mapped to a separate System Resource, which can be matched with any Scheduling Point at the SMUD/CAISO boundary.

**Lake, Rancho Seco**

**Tracy**

**Cottonwood**

Lake/ Rancho Seco: Schedules at Lake and Rancho Seco Scheduling Points are mapped to an aggregated SMUD System Resource representing load, metro area generation, and Upper American River Project hydro generation, based on Intertie Distribution Factors.

Captain Jack

Cosumnes generation

SMUD aggregated resource: load, metro area generation, Upper American River Project generation

 In addition to enforcing individual line constraints on the CAISO-IBAA interface (branch groups can be defined too if needed), intertie limits (including Energy + AS limits) are enforced on designated CAISO-IBAA Branch Groups. ETCs can specify a specific tie to fulfill contract requirements, but then are combined into the total intertie limit for Congestion Management.

Thin lines represent CAISO and IBAA transmission.

Tracy: By default, Schedules at Tracy are mapped to the same aggregation of WAPA System Resources near Cottonwood, Folsom, and Tracy Pumps (load), based on Intertie Distribution Factors – the same as Schedules at Cottonwood.

The real-time distribution of Generation and Load throughout the IBAA (the cloud) is estimated from flows at the CAISO boundary. Real-Time Interchange Schedules submitted to the CAISO Market (at Scheduling Points at the CAISO boundary) are mapped to the same System Resources within the IBAA that are used in the Day-Ahead Market. The resulting Energy appears in the estimated distribution of Generation and Load that is calculated in subsequent Dispatch Intervals.

Cottonwood: Schedules at Cottonwood are mapped to an aggregation of WAPA System Resources near Cottonwood, Folsom, and Tracy Pumps (load), based on Intertie Distribution Factors.

Tracy Pumps (load)

Shasta, Keswick, Redding, etc.

**Figure 2:**

**Implementation Concepts of SMUD/WAPA/MID and TID IBAA Network with
System Resources**



1. The CAISO now has a model of high voltage lines throughout the WECC in its EMS state estimator, and is working on refining the EMS model for areas near the CAISO. Once EMS state estimator has a workable model of the listed candidates as IBAAs , the CAISO will then make an assessment of how to best model these areas in the FNM for the market. Future BPM versions will detail the treatment for each of these areas, as these determinations are completed. [↑](#footnote-ref-1)
2. The IBAA is responsible for managing transmission constraints in its Balancing Authority Area. In an IBAA, "monitoring" means that the CAISO will have the ability to observe constraints in the ECA/ACA, but will not enforce the constraints that are the responsibility of the IBAA. If the CAISO observes a constraint limitation in another Balancing Authority Area, the CAISO's operators would have the ability to inform the other Balancing Authority Area about the CAISO's observations, and the Balancing Authority Area may determine that mutual actions are required to manage the constraint. [↑](#footnote-ref-2)
3. IBAAs were originally referred to as Embedded and Adjacent Control Areas (ECAs and ACAs), which are terms that may appear elsewhere in Business Practice Manuals. [↑](#footnote-ref-3)
4. At a minimum, Resource IDs will be established that map each IBAA transmission owner’s Scheduling Points to System Resources that represent generation owned that transmission owner. Additional Resource IDs will be established as needed. [↑](#footnote-ref-4)
5. The Intertie Distribution Factors in this table have been developed from the CAISO’s operations model using a simple equivalencing technique that has been discussed in meetings between the CAISO and the IBAA operators, using PTI PSS/E version 29. The equivalencing technique consists of three steps, for the limited purpose of computing the Intertie Distribution Factors, as follows:

The SMUD IBAA is equivalenced to only the buses that comprise the System Resources, with all generation also being retained at its buses. The resulting load distribution within each aggregated System Resource defines the Intertie Distribution Factors for exports from the CAISO.

The SMUD IBAA is then equivalenced to only the buses that comprise the System Resources, but this time with no generation being retained. The difference in load at the retained buses after it is netted with generation, relative to step 1, defines the Intertie Distribution Factors for imports to the CAISO.

Because the CAISO anticipates that a single aggregated System Resource will be used for both imports and exports, the Intertie Distribution Factors resulting from steps 1 and 2 are averaged. The specific numbers in this document are illustrative and subject to change. [↑](#footnote-ref-5)
6. Participation using a Dynamic Resource-Specific System Resource or a Non-Dynamic Resource-Specific System Resource is subject to the same applicable Tariff provisions as Resource-Specific System Resources in other Balancing Authority Areas. [↑](#footnote-ref-6)