

Scheduling and Pricing of Integrated Balancing Authority Areas (IBAAs)



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California ISO
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Agenda

- 🌐 What is an Integrated Balancing Authority Area?
- 🌐 IBAA Scheduling and Pricing Concepts
- 🌐 MRTU Marginal Losses Adjustment
- 🌐 Registering Resource IDs
- 🌐 Scheduling Scenarios
- 🌐 IBAA Scheduling and Tagging
- 🌐 Scheduling to Settling
- 🌐 Locating Prices
- 🌐 ETC/TOR/CVR Example

Objectives

By the end of this class, you will be able to:

- 🌐 Describe what an IBAA is
- 🌐 Describe how to submit IBAA Schedules and Bids
- 🌐 Describe where to find IBAA Schedules and Prices
- 🌐 Explain where IBAA transactions are settled

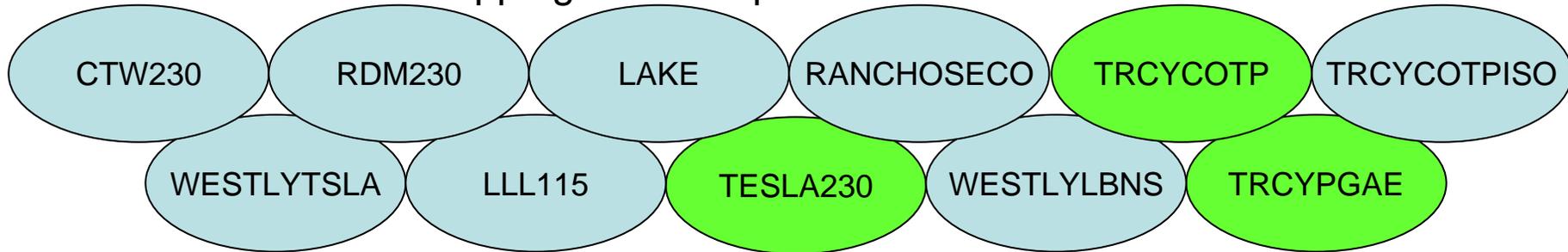
What is an IBAA?

- 🌐 Balancing Authority Area (BAA) that has multiple interconnections with the CAISO.
- 🌐 Parallel transmission and power flow modeling accuracy is dependent on both systems.
- 🌐 IBAA network topology is modeled in further detail in the CAISO's Full Network Model beyond the simple radial modeling of interconnections.
- 🌐 Objectives of IBAA:
 - Ensure feasible forward-market schedules
 - Effective Congestion Management
 - Align forward market *schedules* and *prices*
 - Increase market efficiency
 - Provides more accurate pricing at ties when given insufficient network information of another Balancing Authority.

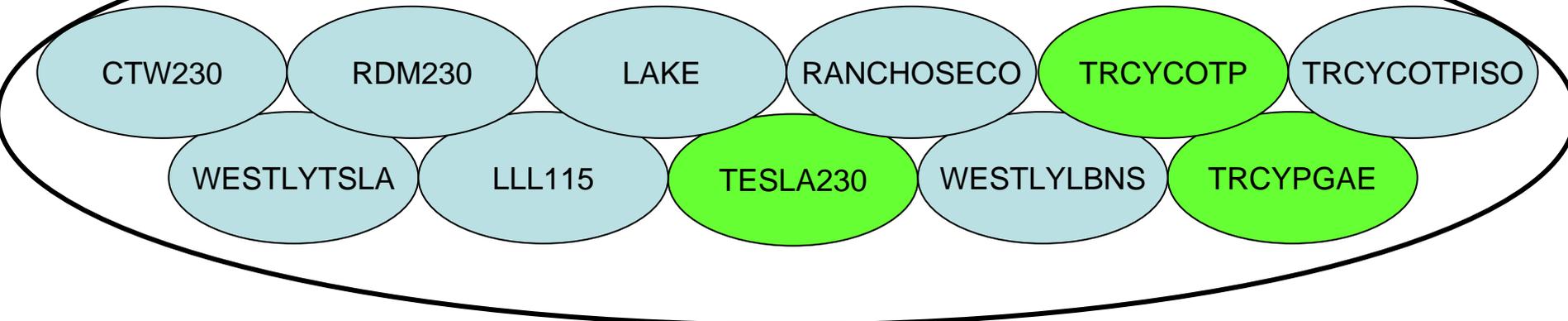
IBAA Scheduling and Pricing Concepts

IN GENERAL,

Imports to the CAISO scheduled at these ties will be paid the import price based on a mapping to the Captain Jack substation



SMUD Hub

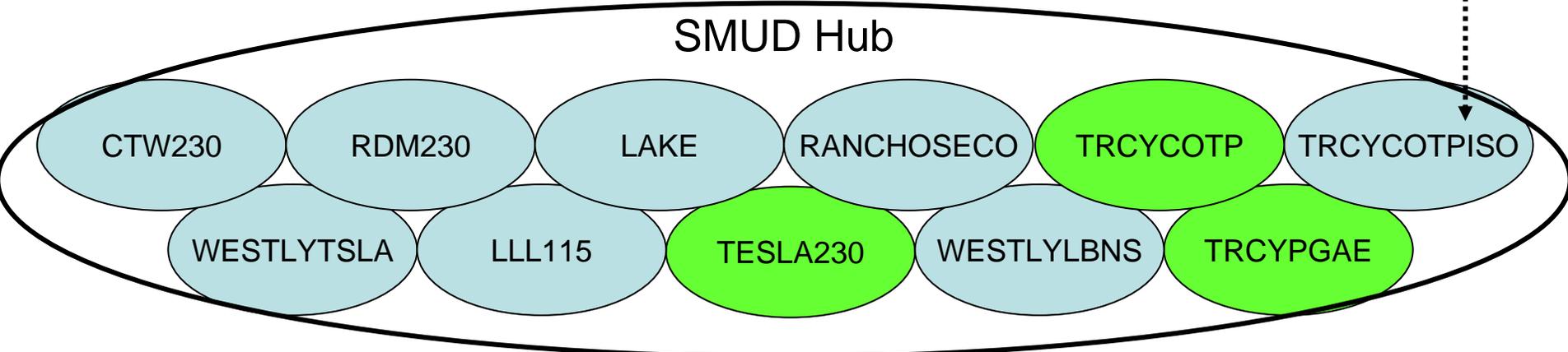
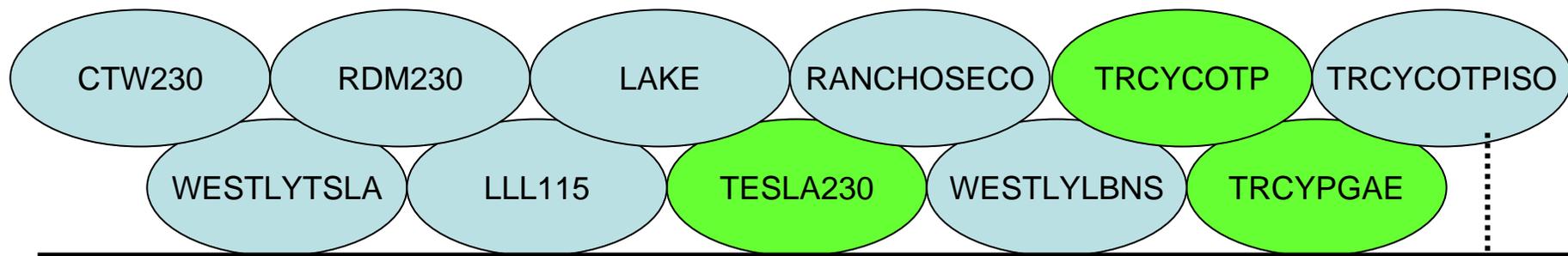


IN GENERAL, Exports from the CAISO scheduled to IBAA at these ties will be charged the SMUD Hub Price

Scheduling Constraint

IBAA Scheduling and Pricing Concepts

EXCEPT, when there is a scheduling constraint on a particular tie. When a scheduling constraint occurs, the price will reflect the constraint at that particular tie point.



Scheduling limit in the import direction will lower LMP at the import tie and will lower LMP in the export direction.

MRTU Marginal Losses Adjustment

- For SCs that pay the Western Area Power Administration (Western) or Transmission Agency of Northern California (TANC) for losses on the use of the COTP:
- The CAISO will replace the Marginal Cost of Losses at the otherwise applicable source for such Schedules with the Marginal Cost of Losses at a price calculated as if an actual generator is located at Tracy.

IBAA Scheduling and Pricing Concepts

- Mapping associated with SMUD interties, to the Captain Jack substations for Imports and SMUD Hub for Exports:

ITC	TNAME	OASIS NODE ID (IMPORT)	OASIS APN OR NODE ID (EXPORT)
COTP_ITC	TRCYCOTP	CAPTJACK_5_N015	SMDG_ASR
COTPISO_ITC	TRCYCOTPISO	CAPTJACK_5_N512	SMDH_ASR
CTW230_ITC	CTW230	CAPTJACK_5_N510	SMD5_ASR
LLNL_ITC	LLL115	CAPTJACK_5_N509	SMD6_ASR
OAKDALE_ITC	OAKDALE	OAKDLTID_1_N001	OAKDLTID_1_N001
RDM230_ITC	RDM230	CAPTJACK_5_N511	SMD4_ASR
RNCHLAKE_ITC	LAKE	CAPTJACK_5_N508	SMD7_ASR
RNCHLAKE_ITC	RANCHOSECO	CAPTJACK_5_N507	SMD8_ASR
STANDIFORD_ITC	STANDIFORD	STANDFD2_1_N011	STANDFD2_1_N011
TRACY230_ITC	TESLA230	CAPTJACK_5_N506	SMD9_ASR
TRACY500_ITC	TRCYPGAE	CAPTJACK_5_N505	SMDA_ASR
WESTLYLBNS_ITC	WESTLYLBNS	CAPTJACK_5_N003	SMDC_ASR
WESTLYTSLA_ITC	WESTLYTSLA	CAPTJACK_5_N504	SMDB_ASR

Scheduling Point (Tie) Names

Current Scheduling Point X-Ref	SCHEDULING POINT (TNAME)	BRANCH_GROUP	GROUP _TYPE	ITC	GROUP_ TYPE	EXP_ MW_ RATING	IMP_ MW_ RATING
CTNWDW_2_CTTNWD	CTW230	CTW230_BG	BG	CTNW230_ITC	ITC	1594	1594
CTNWDW_2_RNDMTN	RDM230	RDM230_BG	BG	RDM230_ITC	ITC	320	320
LAKE_2_GOLDHL	LAKE	RNCHLAKE_BG	BG	RNCHLAKE_ITC	ITC	1271	1271
RANCHO_2_BELOTA	RANCHOSECO						
OAKTID_1_OAKCSF	OAKDALE	OAKDL_BG	BG	OAKDL_ITC	ITC	246	246
LLNL_1_TESLA	LLL115	LLNL_BG	BG	LLNL_ITC	ITC	164	164
NEW	TRCYCOTPISO	COTPISO_MSL	BG	COTPISO_ITC	ITC	33	33
TRACY5_5_COTP	TRCYCOTP	COTP_MSL	BG	COTP_ITC	ITC	1567	1567
TRACY5_5_PGAE	TRCYPGAE	TRACY500_BG	BG	TRACY500_ITC	ITC	4388	4388
TRCYPP_2_TESLA	TESLA230	TRACY230_BG	BG	TRACY230_ITC	ITC	396	396
WESTLY_2_LOSBNS	WESTLYLBNS	WESTLYLBNS_BG	BG	WESTLYLBNS_ITC	ITC	637	637
WESTLY_2_TESLA	WESTLYTSLA	WESTLYTSLA_BG	BG	WESTLYTSLA_ITC	ITC	637	637
STNDFD_1_STNCSF	STANDIFORD	STNDFD_BG	BG	STNDFD_ITC	ITC	306	306
N/A	N/A	TRACYHRDLN_BG	BG	No ITC needed since not a scheduling location.	N/A	73	73

Registering Resource IDs

- When participants register intertie Market Resource ID in the Master File, participant shall identify the IBAA Node or ANode that is associated with the IBAA transaction.
- A Market Resource ID can only be associated with one Node or Anode
- Market Resource ID Registration and Naming Convention:
 - Tname in Market Resource ID will be Tname of the boundary intertie name but the source in the Master File the Market Resource ID is actually linked to Node or ANode where the transaction will be modeled.

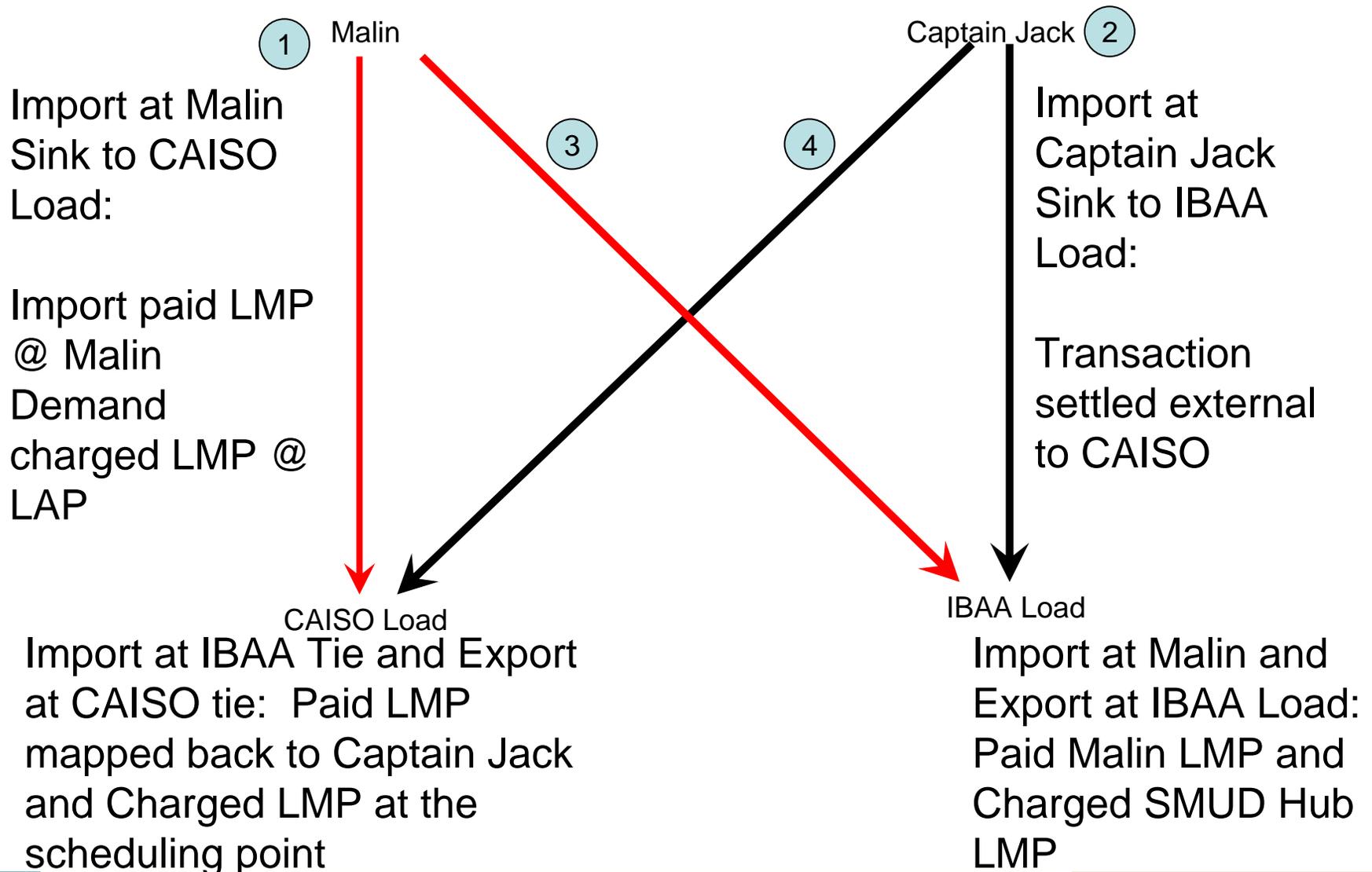
SCID_Tname_I/E_ETYPE_XXXXXX
↓ ↓ ↓ ↓ ↓
JCB1_TRCYPGAE_I_F_000012

Registering Resource IDs for Marginal Losses Adjustment

- Resource IDs need to be established for import schedules to the CAISO Balancing Authority Area at the terminus of the California-Oregon Transmission Project (COTP).
- For the purpose of establishing Schedules that are eligible for Marginal Losses Adjustment, unique Resource IDs can be used to submit Bids and/or Self-Schedules.
- SCs need to certify that these unique Resource IDs will only be used for transactions that use the COTP and pay Western or TANC for losses for the use of the COTP.

Scheduling Scenarios

Imports to Load



QUIZ

- 🌐 If an SC wheels an import at Tracy and exports at Malin, where will this SC be paid and charged?
 - Import side of the wheel will be paid at the Tracy import location mapped back to the Captain Jack price.
 - Export side of the wheel will be charged the LMP at the Malin scheduling point.
- 🌐 If an SC imports at Malin and sinks to a CAISO load, where will this SC be paid and charged?
 - Import will be paid the Malin LMP, and the sink will be charged the LMP at the default LAP where sinked.
- 🌐 How is the Resource ID different for an IBAA Resource versus a CAISO Resource?
 - In general, there is no difference – just a different tie name, unless Resource is registered for Marginal Losses Adjustment

Scheduling and Tagging



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IBAA Scheduling and Tagging – Partial List

MRTU Tie Point	Old Tie Point	Adjacent B/A
CTW230	CTNWDW_2_CTTNWD	SMUD
LAKE	LAKE_2_GOLDHL	SMUD
LLL115	LLNL_1_TESLA	SMUD
OAKDALE	OAKTID_1_OAKCSF	TID
RANCHOSECO	RANCHO_2_BELOTA	SMUD
RDM230	CTNWDW_2_RNDMTN	SMUD
STANDIFORD	STNDFD_1_STNCSF	SMUD
TESLA230	TRCYPP_2_TESLA	SMUD
TRCYCOTP	TRACY5_5_PGAE	SMUD
TRCYCOTPISO**	TRACY5_5_COTP	SMUD
TRCYPGAE	TRACY5_5_PGAE	SMUD
WESTLYLBNS	WESTLY_2_LOSBNS	TID
WESTLYTSLA	WESTLY_2_TESLA	SMUD
**Scheduling point for use of external ISO Transmission rights, not a physical tie.		

Reference:

www.caiso.com/

-Operations Center
 --Markets
 ---Interchange
 Scheduling and Tagging

Misc. Info. Field:

MRTU Tagging Requires
 3 Elements to validate:

-Contract Ref Number
 -Energy Type
 -Resource ID from MF

IBAA Scheduling and Tagging

- 🌐 SCs must provide the correct Market Award information in the “Misc. Info.” field of the Physical Path on the e-Tag to allow the ISO Interchange Transaction System to validate Interchange requests against Market reservations.
- 🌐 Include a Contract Reference Number (CRN) for Existing Transmission Contracts (ETCs), Transmission Ownership Rights (TORs) or Converted Rights (CVRs), otherwise specify NONE.
- 🌐 Include Energy Product Type. One tag per product unless dynamic.
- 🌐 If dynamic, then place the total MW value of all Market Awards in the Transmission Profile, and your Energy award MW value in the Energy Profile of the NERC e-Tag.

IBAA Scheduling and Tagging

MRTU e-tagging References:

- 🌐 The MRTU NERC e-Tagging Templates for tagging Interchange Awards with the ISO may be found at: [www.caiso.com](http://www.caiso.com/Operations%20Center/Markets/Interchange%20Scheduling%20and%20Tagging/MRTU%20Interchange%20Scheduling%20and%20Tagging) / Operations Center / Markets / Interchange Scheduling and Tagging / MRTU Interchange Scheduling and Tagging or by using the following link: <http://www.caiso.com/2098/20987dd9fe40.xls>.
- 🌐 The MRTU Market Data requirements and Business Rules for ISO e-Tagging are located at <http://www.caiso.com/2098/20987ca75020.pdf>.
- 🌐 The ISO's NERC e-Tagging requirements are located in Operating Procedure S-313 NERC Tagging Requirements. The ISO BPM for Market Operations, section 6.3.2 also includes an MRTU e-Tagging reference. <http://www.caiso.com/17e9/17e9d7742f400.html>.

Locating Prices



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Locating the Prices

- Prices may be found in CMRI and OASIS
- Compare Inter-tie Name with the C-Node Mapping Document (from Slide 8)

TRCYPGAE = CAPTJACK_5_N505 (OASIS)

ITC	TNAME	OASIS NODE ID (IMPORT)	OASIS APN OR NODE ID (EXPORT)
TRACY500_ITC	TRCYPGAE	CAPTJACK_5_N505	SMDA_ASR

Locating Prices in OASIS

California ISO OASIS Atlas Prices Transmission System Demand

Report: Locational Marginal Prices (LMP) Market: DAM Node: CAPTJACK_5_N505
 Group: SELECT NODE

Date From: 02/04/2009 To: 02/04/2009

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Locational Marginal Prices (LMP)

DAM	HE01	HE02	HE03	HE04	HE05	HE06	HE07	HE08	HE09
02/04/2009									
CAPTJACK_5_N505									
LMP	50.00847	46.93514	40.41682	42.47393	43.32130	43.74778	49.43947	50.01432	50.01455
Congestion	7.05245	7.15646	4.14402	5.48952	5.10761	4.65709	2.96331	2.08338	1.40155
Energy	42.36712	39.13298	35.63843	36.31263	37.66751	38.60428	46.17601	47.72097	48.48693
Loss	0.58890	0.64569	0.63436	0.67178	0.54618	0.48641	0.30014	0.20997	0.12607

Trade Date: 2/04/09

HE1 LMP: 50.01

MCC: 7.05

MCE: 42.37

MCL: 0.59

Comparing Prices between OASIS and CMRI

Day-Ahead Import-Export Commodity Prices

Start Date: 02/04/2009
End Date: 02/04/2009

Resource: [Empty]
Scheduling Point: IPP, MEAD230, SYLMAR, SILVERPEAK55, GONIPP
Direction: Import, Export
Energy Type: Firm Energy, Non-Firm Energy, Dynamic Interchange, Wheeling, Unit Contingent
Product: Energy, A/S Non-Spinning, A/S Spinning, RUC
Price Type: LMP, Congestion, Energy, Loss, ASMP

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Day-Ahead Import-Export Commodity Prices for 02/04/2009

Scheduling Coordinator:

Resource	Scheduling Point	Direction	Energy Type	Product	Price Type	HE01	HE02	HE03	HE04
						[\$]	[\$]	[\$]	[\$]
_TRCYPGAE_J_F_	TRCYPGAE	Import	Firm Energy	Energy	LMP	50.01	46.94	40.42	42.47
_TRCYPGAE_J_F_	TRCYPGAE	Import	Firm Energy	Energy	Congestion	7.05	7.16	4.14	5.49
_TRCYPGAE_J_F_	TRCYPGAE	Import	Firm Energy	Energy	Energy	42.37	39.13	35.64	36.31
_TRCYPGAE_J_F_	TRCYPGAE	Import	Firm Energy	Energy	Loss	0.59	0.65	0.63	0.67

Trade Date: 2/04/09

HE1 LMP: 50.01

MCC: 7.05

MCE: 42.37

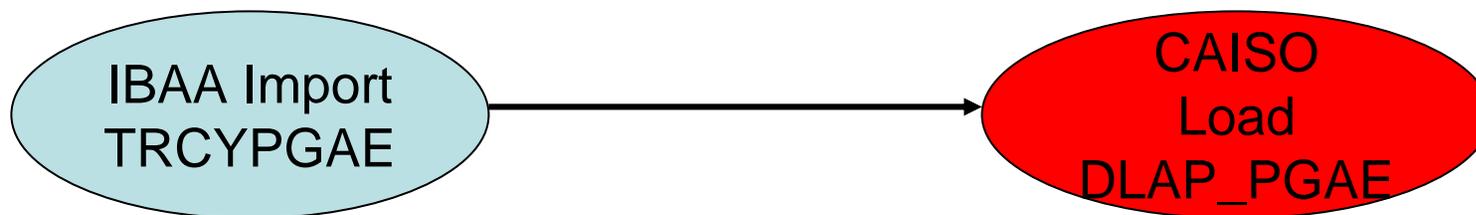
MCL: 0.59

Validating Prices

- 🌐 In general, any import scheduled on one of the IBAA ties will be paid the LMP mapped back to Captain Jack.
- 🌐 In general, any exports scheduled on one of the IBAA ties will be charged the SMUD Hub price.
- 🌐 Price differentials are the result of either:
 - A scheduling constraint at a particular tie or
 - A Marginal Losses Adjustment
- 🌐 Scheduling constraints may be validated in OASIS
 - Transmission Tab
 - Transmission Interface Usage

Using ETC/TOR/CVRs

*Note: For simplicity, no losses are illustrated in this example



Schedule: 100MW

Import LMP = \$45.00
SMEC = 42.00
MCL = 0.00
MCC = 3.00

Initial Calculation:

$-1(100) \times \$45 = (\$4500)$

ETC/TOR/CVR Calculation:

MCC (Sink) – MCC (Source) x Schedule
 $(8.00 - 3.00) \times 100 = (\$500)$

SC is paid $(\$4500) + (\$500) = (\$5000)$

SC is charged \$5000

Net = \$0

Schedule: -100MW

DLAP LMP = \$50.00
SMEC = 42.00
MCL = 0.00
MCC = 8.00

Initial Calculation:

$-1(-100) \times \$50 = \5000

Putting it all together

- 🌐 Verify your Resources in the Master File
- 🌐 Master File changes prior to Go Live will not be accepted after February 27

REMINDERS

- 🌐 Import bids requires a monotonically INCREASING bid curve
- 🌐 Export bids require a monotonically DECREASING bid curve
- 🌐 Bids and schedules are received through SIBR
- 🌐 Day-Ahead Market results may be retrieved through CMRI
- 🌐 Real-time dispatches will be done in the HASP
- 🌐 Pricing may be found in CMRI and OASIS

Wrapping It Up...

- 🌐 Imports and Exports are scheduled just like any other transaction at a scheduling point.
- 🌐 In general, imports to the CAISO Control Area using IBAA scheduling points will be paid the import price based on a mapping to the Captain Jack substation.
- 🌐 In general, exports from the CAISO Control Area will be charged the SMUD Hub Price.
- 🌐 Marginal Losses Adjustments may affect the LMP for SCs that use COTP and pay losses to Western or TANC
- 🌐 Scheduling constraints at the IBAA ties may affect the LMP for transactions at that IBAA tie location
- 🌐 Scheduling constraints may be validated under the Transmission tab on OASIS

