23. Temporary Changes to the Real-Time Market for Imbalance Energy

23.1 Application

Notwithstanding any other provision of the ISO Tariff, the amendments to the ISO Tariff set forth in Sections 23.2 through 23.5 shall continue in effect until such time as:

(a)the ISO has applied to the FERC for new, long-term, changes to the ISO Tariff in regard to the Real-Time Market for Imbalance Energy, in connection with implementing a sub-hour Settlement Period; and

(b)the FERC has approved new, long-term, changes to the ISO Tariff in regard to the Real Time Market for Imbalance Energy.

23.2 ISO Tariff Amendments

23.2.1 Amendments to the Body of the ISO Tariff

2.5.22.4.1Timing of Supplemental Energy Bids.

Supplemental Energy bids must be submitted to the ISO no later than ***forty-five (45)*** ***30*** minutes prior to the operating hour. Bids may ***also*** be submitted at any time after the Day-Ahead Market closes. These Supplemental Energy bids cannot be withdrawn after ***forty-five (45)*** ***thirty (30)*** minutes prior to the Settlement Period. The ISO may dispatch the associated resource at any time during the Settlement Period.

2.5.22.10 Dispatch instructions. Dispatch instructions shall include the following information:

(a)name of the Generating Unit, ***System Unit,*** Load or System Resource being dispatched;

(b)specific MW value to which the Generating Unit, ***System Unit,*** Load or System Resource is being dispatched;

(c)operating level and price point to which the Generating Unit, ***System Unit,*** Load or System Resource is being dispatched;

(d)time the Generating Unit, ***System Unit,*** Load or System Resource is required to achieve the Dispatch instruction;

(e)time of the Dispatch instruction; and

(f)any other information which the ISO considers relevant.

All Dispatch instructions except those for the Dispatch of Regulation (which will be communicated by direct digital control signals) will be communicated by telephone. Except in the case of deteriorating system conditions or emergency, and except for instructions for the Dispatch of Regulation, the ISO will send all Dispatch instructions to the Scheduling Coordinator for the Generating Unit, ***System Unit,*** Load or System Resource which it wishes to Dispatch. The recipient Scheduling Coordinator shall ensure that the Dispatch instruction is communicated immediately to the operator of the Generating Unit***, System Unit, external import of System Resources*** or Load concerned. ***The ISO may, with the prior permission of the Scheduling Coordinator concerned, communicate with and give Dispatch instructions to the operators of Generating Units, System Units, external imports of System Resources and Loads directly without having to communicate through their appointed Scheduling Coordinator.*** The recipient ***Scheduling Coordinator*** of a Dispatch instruction shall confirm the Dispatch instruction by repeating the Dispatch instruction to the ISO. The ISO shall record on tape all voice conversations which occur on the Dispatch instruction communication equipment. These recordings may be used to audit the dispatch instructions, and to verify the response of Generating Units, ***System Units, external imports of System Resources and*** Loads ***and System Resources*** to Dispatch instructions.

The ***dispatch Dispatch*** instruction and all information associated with it shall be logged and recorded by the ISO as soon as practical after issuing each instruction. The ISO Protocols govern the content, issue, receipt, confirmation and recording of ***dispatch Dispatch*** instructions.

2.5.23.1 General Principles. Imbalance Energy shall be priced ***in two time intervals*** using the ***BEEP Interval Five Minute*** Ex Post Price***s for Instructed Imbalance Energy per resource*** and the Hourly Ex Post Price ***for Uninstructed Imbalance Energy***. The ***Five Minute*** Ex Post Price***s*** shall be based on the bid of the marginal Generating Units, ***System Units,*** Loads and System Resources dispatched by the ISO to reduce Demand or to increase or decrease Energy output in each ***BEEP Interval five minute period*** .

The marginal Generating Unit, ***System Unit,*** Load or System Resource dispatched in ***each BEEP Interval the five minute period*** is

(a)if ***generation Generation*** output is increased, or Demand reduced, the Generating Unit, ***System Unit,*** Load or System Resource with the highest bid that is accepted by the ISO***'s BEEP Software*** for incremental Generation, or Demand reduction; or

(b)if ***generation Generation*** output is decreased, the Generating Unit***, System Unit, Load*** or System Resource with the lowest bid that is accepted by

the ISO*'s BEEP Software* for decremental Generation.

Where a Scheduling Coordinator has identified specific Generating Units, Loads or System Resources as the providers of the additional Operating Reserve required to cover any Interruptible Imports and on-demand obligations which it has scheduled, the Proxy Energy Bid prices of those resources for the incremental Energy, or decremental Demand, dispatched by the ISO from the Operating Reserve provided by those resources, shall not be taken into account in the determination of the Hourly Ex Post Price.

When an Inter-Zonal Interface is operated at the capacity of the interface (whether due to scheduled uses of the interface, or decreases in the capacity of the interface), the marginal incremental or decremental bid prices in some Zones may differ from one another. In such cases, the ISO will determine separate ***Hourly*** Ex Post Prices for the Zones.

The ISO will respond to the Dispatch instructions issued by the BEEP Software to the extent practical in the time available and acting in accordance with Good Utility Practice. The ISO will record the reasons for any variation from the Dispatch instructions issued by the BEEP Software.

2.5.23.2 Determining *Five Minute Ex Post Price and Hourly* Ex Post Price*s*

2.5.23.2.1 BEEP Interval Ex Post Prices. For each ***five minute period*****BEEP Interval***, the ISO will compute an updated dispatch price curve, using the Generating Units, ***System Units,*** Loads and System Resources dispatched ***according to the ISO's BEEP Software*** during that time period to meet Imbalance Energy requirements. ***For each BEEP Interval of the Settlement Period, BEEP will compute an incremental Ex Post Price and a decremental Ex Post Price. The incremental Ex Post Price will equal the highest price bid selected in the BEEP Interval. The decremental Ex Post Price will equal the lowest price bid selected in the BEEP Interval.*** The ***Five Minute*** Ex Post Price***s*** for each ***period*****BEEP Interval** will equal the marginal bid of the marginal Generating Unit, ***System Unit,*** Load, or System Resource as described in Section 2.5.23.1.

If the net quanitty of Imbalance Energy in the five minute period t is positive then**The BEEP Interval incremental Ex Post Price will be computed for each BEEP Interval i as***

$$P5Min_i = Max(EnBid_i)_i$$

$$PI_i = Max(EnBid_r)_i$$

The BEEP Interval decremental Ex Post Price will be computed for each BEEP Interval i as

$PD_i = Min(EnBid_{r\,i})_i$

Wherewhere

$EnBid_{r\,i}$ = Energy bid price***s*** of the ***Generating Units, Loads and System Resourcesresource*** providing Ancillary ***ServicesService Energy, and the or*** Supplemental Energy ***bids of other Generating Units, Loads and System Resources dispatched by the ISO during the five minute period***.

If the net quantity of Imbalance Energy in the five minute period t is negative then

$P5Min_i = Miin(Enbid_i)_i$

In the event of Inter-Zonal Congestion, the ISO will develop a dispatch price curve, and ***BEEP Interval Ex Post Pricesan Ex Post Five Minute Price $P5Min_{xt}$*** for each Zone where congestion exists.

2.5.23.2.2 Hourly Ex Post Price Applicable to Uninstructed Deviations. The Hourly Ex Post Price ***applicable to Uninstructed Imbalance Energy in Settlement Period t*** in each zone will equal the Energy weighted average of the ***BEEP Interval 12 Five Minute Ex Post Pricescharges*** in each Zone, calculated as follows:

$$PHourExPost_x = \frac{\sum_{t=1}^{12} (P5Min_{xt} * SysDev)_t}{\sum_{t=1}^{12} SysDev_t}$$

$$PHourExPostx = \frac{(\sum_{ji} |MWh_{jix}| * BIP_{ix})}{\sum_{ji} |MWh_{jix}|}$$

where:

$PHourExPost_x$ = Hourly Ex Post Price in Zone x

BIP_{ix} = BEEP Interval Ex Post Price

j = the number of Scheduling Coordinators with instructed deviations

$IIEC_{jix}$ = the Instructed Imbalance Energy Charges for Scheduling Coordinator j for the BEEP Interval i in Zone x

$IMWH_{jix}$ = the Instructed Imbalance Energy for Scheduling Coordinator j for the BEEP Interval i in Zone x

$P5Min_{xt}$= Five minute Ex Post Price in Zone x in period t

$SysDev_t$ = the absolute difference (whether positive or negative) between (the deviation between scheduled and metered Demand) and (the deviation between scheduled and metered Generation) in five minute period t in Zone x.

If the ISO declares a System Emergency, e.g. during times of supply scarcity, and involuntary load shedding occurs during the real time ***dispatch Dispatch***, the ISO shall set the Hourly Ex Post Price at the Administrative Price.

11.2.4.1 Net Settlements for *Uninstructed* Imbalance Energy.

Uninstructed Imbalance Energy attributable to each Scheduling Coordinator in each Settlement Period in the relevant Zone shall be deemed to be sold or purchased, as the case may be, by the ISO and ***charges or*** payments for ***Uninstructed*** Imbalance Energy shall be settled by debiting or crediting, as the case may be, the Scheduling Coordinator with an amount for each Settlement Period equal to ***the sum of*** :

(a) The quantity of undelivered Instructed Imbalance Energy, multiplied by the Effective Price, and

(b) The quantity of deviation from the final Hour-Ahead Schedule multiplied by the Hourly Ex Post Price.

Imbalance Energy charge will be calculated as follows:

IECharge = DevC + ASSEDevC

where:

$$DevC = \sum_i GenDevC_i + \sum_i LoadDevC_i + \sum_q ImpDevC_q + \sum_q ExpDevC_q + UFEC$$

$$ASSEDevC = \sum_{i} ASSEGenDevC_i + \sum_{i} ASSELoadDevC_i + \sum_{q} ASSEImpDevC_q$$

and

~~The deviation between scheduled and actual Energy Generation for Generator i represented by the Scheduling Coordinator for the Settlement Period is calculated as follows:~~

~~$$GenDev_i = G_s * GMM_f - \left[\left(G_a - G_{adj}\right) * GMM_{ah} - G_{a/s} - G_{s/e}\right] - UnavailAncServMW_{ixt}$$~~

~~***$UnavialAncServMW_{ixt}$ =Max[-($G_{i,\ oblig}$-$G_{a/s}$), Min(0,Pmax- Ga-($G_{i,\ oblig}$-$G_{a/s}$))]***~~

~~***$GenDevC_i$= $GenDev_i$ * P in case of (b) above, and***~~

~~***If $G_{a/s}$ + $G_{s/e}$ > 0 and P < P_{eff} then:***~~

~~***$ASSEGenDevC_i$=Max[0,[$G_{a/s}$ -Max[0,(G_a -G_{adj}-G_s)]]]* (P_{eff-I} -P) in case of (a) above, or***~~

~~***If $G_{a/s}$ + $G_{s/e}$ < 0 and P > P_{eff} then:***~~

~~***$ASSEGenDevC_i$=Min[0,[$G_{a/s}$ -Min[0,(G_a -G_{adj}-G_s)]]]* (P_{eff-I} -P) in case of (a) above***~~

~~The deviation between scheduled and actual Load consumption for Load i represented by the Scheduling Coordinator for the Settlement Period is calculated as follows:~~

~~$$LoadDev_i = L_s - \left[\left(L_a - L_{adj}\right) + L_{a/s} + L_{s/e}\right] - UnavailDispLoadMW_{ixt}$$~~

~~***Where:***~~

~~***$UnavailDispLoadMW_{ixt}$= Max[0, ($L_{i,\ oblig}$-$L_{a/s}$)-L_a***~~

~~***$LoadDevC_i$=$LoadDev_i$ * P in case of (b) above, and***~~

~~***If $L_{a/s}$ + $L_{s/e}$ > 0 and P < P_{eff} then:***~~

~~***$ASSELoadDevC_i$=Max[0,[$L_{a/s}$ -Max[0,(L_a -L_{adj}-L_s)]]]* (P_{eff-I} -P) in case of (a) above, or***~~

~~***If $L_{a/s}$ + $L_{s/e}$ < 0 and P > P_{eff} then:***~~

~~***$ASSELoadDevC_i$=Min[0,[$L_{a/s}$ -Min[0,(L_a -L_{adj}-L_s)]]]* (P_{eff-I} -P) in case of (a) above***~~

~~The deviation between forward, scheduled and Real Time adjustments to Energy imports, adjusted for losses, for Scheduling Point q represented by the Scheduling Coordinator for the Settlement Period is calculated as follows:~~

~~$$ImpDev_q = I_s * GMM_{fq} - \left[\left(I_a - I_{adj}\right) * GMM_{ahq}\right] + I_{a/s}$$~~

~~***$ImpDevC_g$= $ImpDev_g$ * P in case of (b) above, and***~~

If $l_{a/s}$ > 0 and P < P_{eff} then

$ASSEImpDevC_q$=Max[0,[$L_{a/s}$ -Max[0,(L_a -L_{adj}-L_s)]]]* (P_{eff-q} -P) in case of (a) above,

or

If $l_{a/s}$ < 0 and P > P_{eff} then:

$ASSEImpDevC_q$=Min[0,[$L_{a/s}$ -Min[0,(L_a -L_{adj}-L_s)]]]* (P_{eff-q} -P) in case of (a) above

The deviation between forward, scheduled and Real Time adjustments to Energy exports for Scheduling Point q represented by the Scheduling Coordinator for the Settlement Period is calculated as follows:

$$ExpDev_q = E_s - E_a - E_{adj}$$

$ExpDevC_q$= $ExpDev_q$ * P

and where:

G_s = sum of effective schedules for Day-Ahead and Hour-Ahead

GMM_f = estimated GMM for Day-Ahead

G_a = actual metered Generation

G_{adj} = deviations in real time ordered by the ISO for purposes such as Congestion Management

GMM_{ah}= hour-ahead GMM (proxy for ex-post GMM)

$G_{a/s}$ = Energy generated from Ancillary Service resource or Supplemental Energy resource due to ISO dispatch instruction

$G_{s/e}$ ***= Energy generated from Supplemental Energy resource due to ISO dispatch instruction***

L_s = sum of Demand scheduled for Day-Ahead and Hour-Ahead

L_a = actual metered Demand

~~L_{adj} = Demand deviation in real time ordered by ISO for purposes such as Congestion Management~~

~~$L_{a/s}$ = Demand reduction from Ancillary Service resource due to ISO dispatch instruction~~

~~$L_{s/e}$ = Demand reduction from Supplemental Energy resource due to ISO dispatch instruction.~~

~~GMM_{fq} = estimated GMM for an Energy import at Scheduling Point q for Day-Ahead~~

~~GMM_{ahq} = estimated GMM for an Energy import at Scheduling Point q for Hour-Ahead (proxy for ex-post GMM)~~

~~I_S = sum of Scheduled Energy import scheduled through Scheduling Point q for Day-Ahead and Hour-Ahead~~

~~I_a = sum of actual Energy import scheduled through Scheduling Point q.~~

~~I_{adj} = deviation in real time import ordered by ISO for purposes such as Congestion Management, and import curtailment.~~

~~$I_{a/s}$ = Energy generated from Ancillary Service System Resources or Supplemental Energy from interties due to dispatch instruction~~

~~E_S = sum of scheduled Energy export scheduled through Scheduled Point q for Day-Ahead and Hour-Ahead~~

~~E_a = sum of actual Energy export scheduled through Scheduling Point q for Day-Ahead and Hour-Ahead~~

~~E_{adj} = deviation in real time export ordered by ISO for purposes such as Congestion Management, and export curtailment~~

~~P = Hourly Ex Post Price for~~ ***Uninstructed*** ~~Imbalance Energy for the relevant hour~~***, as defined in Section 2.5.23.2.2***

~~P_{eff} =~~ ***Effective Price for Instructed Imbalance Energy for the relevant Settlement Period***

~~$G_{i, oblig}$ =~~ ***the amount of Spinning Reserve, the amount of Non-Spinning Reserve, and the amount of Replacement Reserve that Generating Unit or System***

Resource i has been selected to supply to the ISO, as reflected in final Ancillary Services schedules.

$PMax_i$ = the maximum capability (in MW) at which Energy and Ancillary Services may be scheduled from the Generating Unit or System Resource i.

$L_{i, oblig}$ = the amount of Non-Spinning Reserve and Replacement Reserve that dispatchable Load i has been selected to supply to the ISO, as reflected in final Ancillary Services schedules for Settlement Period t.

~~***UFEC*** = the Unaccounted for Energy Charge for the Scheduling Coordinator calculated as follows:~~

~~Unaccounted for Energy Charge~~

~~The hourly Unaccounted for Energy Charge on Scheduling Coordinator j for Settlement Period t for each relevant Zone is calculated in the following manner:~~

The UFE for each utility service territory *k* is calculated as follows,

$$E_{UFE\_UDC\_k} = \left(I_k - E_k + G_k - \left(RTM_k + LPM_k\right) - TL_k\right)$$

The Transmission Loss calculation per Settlement Period t per relevant Zone for each utility service territory k is calculated as follows,

$$TL_k = \sum\left[G_a * \left(1 - GMM_{ah}\right)\right] + \sum\left[I_a\left(1 - GMM_{ahq}\right)\right]$$

Each metered demand point, either ISO grid connected or connected through a UDC, is allocated a portion of the UFE as follows:

$$E_{UFE\_z} = \frac{D_z}{\sum_Z D_z} E_{UFE\_UDC\_k}$$

The UFE charge for Scheduling Coordinator j per Settlement Period per relevant Zone is then,

$$UFEC_j = \left(\sum_z E_{UFE\_z}\right) * P_{xt}$$

Where the terms used in the equations have the following meaning:

$E_{UFE\_UDC\_k}$ -- MWh

The Unaccounted for Energy (UFE) for utility service territory k.

E_{UFE_z} -- MWh

The portion of Unaccounted for Energy (UFE) allocated to metering point z.

I_k -- MWh

The total metered imports into utility service territory k in Settlement Period t.

E_k -- MWh

The total metered exports from utility service territory k in Settlement

Period t.

G_k -- MWh

The total metered Generation in Settlement Period t in utility service territory k.

RTM_k -- MWh

The Settlement Period t total of the real-time metering in utility service territory k in Settlement Period t.

LPM_k -- MWh

The calculated total of the Load Profile metering in utility service territory k per Settlement Period t.

TL_k -- MWh

The Transmission Losses per Settlement Period t in utility service territory k.

D_z -- MWh

The Demand including Exports in Settlement Period t at metered point z

~~The ISO shall develop protocols and procedures for the monitoring of persistent intentional excessive imbalances by Scheduling Coordinators and for the imposition of appropriate sanctions and/or penalties to deter such behavior. The net balance of the charges attributable to all Scheduling Coordinators represents the Transmission Losses imbalance total for each hourly Settlement Period.~~

~~11.2.4.1.1 Settlement for Instructed Imbalance Energy~~

~~Instructed Imbalance Energy attributable to each Scheduling Coordinator J in each Settlement Period t in the relevant Zone shall be deemed to be sold or purchased, as the case may be, by the ISO and payments for Instructed Imbalance Energy shall be settled by~~

~~debiting or crediting, as the case may be, the Scheduling Coordinator with an amount for each Settlement Period t equal to:~~

~~$IIEC_j = IGDC_j + ILDC_j + IIDC_j$~~

~~where:~~

~~Instructed Generation Deviation Payment/Charge is calculated as follows:~~

$$IGDC = \sum_{gi} \frac{G_{gi} * P_i}{HBI}$$

~~Instructed Load Deviation Payment/Charge is calculated as follows:~~

$$ILDC = \sum_{Li} \frac{L_{Li} * P_i}{HBI}$$

~~Instructed Import Deviation Payment/Charge is calculated as follows:~~

$$IIDC = \sum_{Ii} \frac{I_{Ii} * P_i}{HBI}$$

~~and where:~~

~~$IGDC_j$=total of instructed Generation deviation payments/charges for the Settlement Period t~~

~~$ILDC_j$=total of instructed Demand deviation payments/charges for the Settlement Period t~~

~~$IIDC_j$=total of instructed import deviation payments/charges for the Settlement Period t~~

~~G_{gi}=instructed Energy (in MW) for Generating Unit g during BEEP Interval i~~

~~L_{Li}=instructed Energy (in MW) for Load L during BEEP Interval i~~

~~I_{Ii}=instructed Energy (in MW) for import I during BEEP Interval i~~

~~P_i = the BEEP incremental Ex Post Price for BEEP Interval i if the net~~

instructed Energy for resources is positive. Or, the BEEP decremental Ex Post Price for BEEP Interval i if the net instructed Energy for resources is negative

HBI= the Number (2-12) of BEEP Intervals in the Settlement Period: the maximum number of intervals in the Settlement Period that BEEP can instruct a resource for incremental/decremental Energy.

23.2.2 Amendments to the Master Definitions in the ISO Tariff

BEEP Interval	*The time period, which may range between five (5) and thirty (30) minutes, over which the ISO's BEEP Software measures deviations in Generation and Demand, and selects Ancillary Service and Supplemental Energy resources to provide balancing Energy in response to such deviations. As of the ISO Operations Date, the BEEP Interval shall be ten (10) minutes. The ISO may, by seven (7) days' notice published on the ISO's Home Page, at http://www.caiso.com (or such other internet address as the ISO may publish from time to time), increase or decrease the BEEP Interval within the range of five (5) to thirty (30) minutes.*
BEEP Interval Ex Post Prices	*The prices charged to or paid by Scheduling Coordinators for Instructed Imbalance Energy in each Zone in each BEEP Interval. The prices will vary between Zones if Congestion is present. The BEEP Interval Ex Post Price is equal to the bid price of the marginal resource accepted by the ISO for Dispatch and deemed eligible by the ISO to set the price during the BEEP Interval. For each BEEP Interval: the BEEP Interval Ex Post Price for incremental Energy will equal the highest price bid selected by the BEEP software; and the BEEP Interval Ex Post Price for decremental Energy will equal the lowest price bid selected by the BEEP software.*

BEEP Software	***The balancing energy and ex post pricing software which is used by the ISO to determine which Ancillary Service and Supplemental Energy resources to Dispatch and to calculate the Ex Post Prices.***
Ex Post Price	***The Hourly Ex Post Price or the BEEP Interval Ex Post Prices.***
Uninstructed Imbalance Energy	***The real time change in Generation or Demand other than that instructed by the ISO or which the ISO Tariff provides will be paid at such price.***
Five Minute Ex Post Price	***The price charged or paid to Scheduling Coordinators responsible for Participating Generators, System Resources or Participating Buyers for Imbalance Energy in each Zone. The price will vary between Zones if Congestion is present. This five minute price is equal to the bid price of the marginal resource accepted by the ISO for dispatch and deemed eligible under the ISO Tariff to set the price during a five minute period.***
Hourly Ex Post Price	The price charged or paid to Scheduling Coordinators responsible for Participating Generators and Participating Buyers for Imbalance Energy in each Zone. The price will vary between Zones if Congestion

	Is present. The Hourly Ex Post Price is the Energy weighted average of the ***BEEP Interval 12 Five Minute***Ex Post Prices in each Zone during each Settlement Period.
Instructed **Imbalance Energy**	The real time change in Generation output or Demand (from dispatchable Generating Units or Loads) which is instructed by the ISO to ensure that reliability of the ISO Control Area is maintained in accordance with Applicable Reliability Criteria. Sources of Imbalance Energy include Spinning and Non-spinning Reserves, Replacement Reserve, and Energy from other Generating Units that are able to respond to the ISO's request for more or less Energy.

23.3 Amendments to the Dispatch Protocol

DP 3.2 Supplemental Energy

In addition to the Final Schedules, Supplemental Energy bids will be available to the ISO real time dispatchers, as described in the SBP, by ***forty-five (45)30*** minutes prior to the start of the Settlement Period to which such Supplemental Energy bids apply.

DP 3.4.3 Verbal Communication with Generators

Normal verbal communication of Dispatch Instructions between the ISO and Generators will be via the relevant SC. Each SC must immediately pass on to the Generator concerned any verbal communication for the Generator which it receives from the ISO. If the ISO considers that there has been a failure at a particular point in time or inadequate response over a particular period of time by the Generating Units to the Dispatch Instruction, the ISO will notify the relevant SC. ***The ISO may, with the prior permission of the Scheduling Coordinator concerned, communicate with and give Dispatch instructions to the operators of Generating Units and Loads directly without having to communicate through their appointed Scheduling Coordinator.*** In situations of deteriorating system conditions or emergency, the ISO

reserves the right to communicate directly with the Generator(s) as required to ensure System Reliability.

23.4 Amendments to the Schedules and Bids Protocol

SBP 4.1 Content of Adjustment Bids

Adjustment Bids are contained in Preferred Schedules and Revised Schedules submitted by SCs for particular Generating Units ***(including Physical Scheduling Plants)***, Dispatchable Loads and external imports/exports. Adjustment Bids cannot be submitted with respect to Inter-Scheduling Coordinator Energy Trades.

Each SC is required to submit a preferred operating point for each Generating Unit, Dispatchable Load and external import/export (these quantities are presented in the SC's submitted Schedule as "Hourly MWh"). The SC's preferred operating point for each Generating Unit, Dispatchable Load and external import/export must be within the range of any Adjustment Bids to be used by the ISO. The minimum MW output level, which may be zero MW (or negative for pumped storage resources), and the maximum MW output level must be physically achievable.

SBP 5.1 Content of Ancillary Services Schedules and Bids

Ancillary Services in the Day-Ahead Market and the Hour-Ahead Market are comprised of the following: Regulation, Spinning Reserve, Non-Spinning Reserve and Replacement Reserve. Each Generating Unit ***(including Physical Scheduling Plants)***, System Unit, Curtailable Demand or external import/export for which a SC wishes to submit Ancillary Services schedules and bids must meet the requirements set forth in the Ancillary Services Requirements Protocol (ASRP). For each Ancillary Service offered to the ISO auction or self-provided, SCs must include a bid price for Energy in the form of a staircase function composed of up to eleven (11) ordered pairs (i.e., ten (10) steps or price bands) of quantity/price information. These staircase functions must be either monotonically non-decreasing (Generating Units, System Units, and external imports) or monotonically non-increasing (Curtailable Demands and external exports). The same resource capacity may be offered into more than one ISO Ancillary Service auction at the same time (the sequential evaluation of such multiple offers between Ancillary Services markets to eliminate double counting of capacity is described in the SP). In each category of Ancillary Service, the reference to "Revised" types of Schedules indicates a submittal which is part of a Revised Day-Ahead Schedule as described in the SP. Each of the following data sections can be submitted up to seven (7) days in advance. There is no provision for external imports/exports with regard to Ancillary Services bids, only self-provided Ancillary Service schedules

under Existing Contracts. The functionality necessary to accept such bids does not exist in the ISO scheduling software.

SBP 6.1.1 Generation Section of Supplemental Energy Bid Data

Each SC offering Supplemental Energy to the ISO will submit the following information for each Generating Unit for each Settlement Period:

(a)SC's ID code;

(b)name of Generating Unit;

(c)Generating Unit operating limits (high and low MW);

(d)Generating Unit ramp rate in MW/minute; and

(e)the MW and $/MWh values for each Generating Unit for which a Supplemental Energy bid is being submitted consistent with this SBP 6.

A Physical Scheduling Plant shall be treated as a single Generating Unit for Supplemental Energy bid purposes.

23.5 Amendments to the Settlement and Billing Protocol

C 2.1.3 Real-Time Market

Each Scheduling Coordinator will be paid for the real time instructed Energy output from Dispatched Spinning Reserve, Non-Spinning Reserve, and Replacement Reserve[1] resources which it represents at the real time Hourly Ex Post Price, in accordance Appendix D, section D 2.1.2. Each Scheduling Coordinator will also be paid for Supplemental Energy Dispatched from resources which it represents at the same Hourly Ex Post Price. This payment for Scheduling Coordinator j for providing Energy output from a resource i in Zone x for Trading Interval t is calculated as follows:

$EnQPay_{ijxt} = EnQ_{ijxt} * P_{xt}$

The total payment to each Scheduling Coordinator for real time Instructed Imbalance Energy output from all resources which it represents for a given Trading Interval in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as

follows:

$$EnQPayTotal_{ijxt} = \sum_{i} EnQPay_{ijxt}$$

C 3.18 EnQ_{ijx} – MWh

The Dispatched and Supplemental Energy output in the Real Time Market from

[1] For Regulation, differences between instructed and metered Energy shall be settled as Uninstructed Imbalance Energy in accordance with Appendix G2.1.

resource i by Scheduling Coordinator j in Zone x for.

C 3.20 P_{xt} - $/MWh

The Hourly Ex Post Price of Imbalance Energy in the Real Time Market in Zone x for Trading Interval t.

D 2.1 **D 2.1.1 *Uninstructed* Imbalance Energy Charges on Scheduling Coordinators**

Uninstructed Imbalance Energy attributable to each Scheduling Coordinator in each Settlement Period in the relevant Zone shall be deemed to be sold or purchased, as the case may be, by the ISO and charges or payments for Uninstructed Imbalance Energy shall be settled by debiting or crediting, as the case may be, the Scheduling Coordinator with an amount for each Settlement Period equal to the sum of:

(a) The quantity of undelivered Instructed Imbalance Energy, multiplied by the Effective Price, and

(b) The quantity of deviation from the final Hour-Ahead Schedule multiplied by the Hourly Ex Post Price.

Imbalance Energy charge will be calculated as follows:

$$IECharge = DevC + ASSEDevC$$

Where:

$$DevC = \sum_i GenDevCi - \sum_i LoadDevCi + \sum_q ImpDevCq - \sum_q ExpDevCq + UFEC$$

$$ASSEDevC = \sum_i ASSEGenDevCi + \sum_i ASSELoadDevCi + \sum_q ASSEImpDevCq$$

and

The deviation between scheduled and actual Energy Generation for Generator i represented by Scheduling Coordinator j in Zone x during ***Trading Interval t*** ***Settlement Period t*** is calculated as follows:

$GenDev_i = G_s * GMM_f - [(G_a - G_{adj}) * GMM_{ah} - G_{a/s} - G_{s/e}] - UnavailAncServMW_{ixt}$

Where:

$UnavailAncServMW_{ixt} = Max\ [-(G_{i,\ oblig} - G_{a/s}),\ Min[0,\ Pmax - G_a - (G_{i,\ oblig} - G_{a/s})]]$

$GenDevC_i = GenDev_i * P$ in case of (b) above, and

If $G_{a/s} + G_{s/e} > 0$ and $P < P_{eff}$ then:

$ASSEGenDevC_i = Max[0,[G_{a/s} + \boldsymbol{G_{s/e}} - Max\ [0,\ (G_a - G_{adj} - G_s)]]]*(P_{eff\text{-}I} - P)$ in case of (a) above, or

If $G_{a/s} + G_{s/e} < 0$ and $P > P_{eff}$ then:

$ASSEGenDevC_i = Min[0,[G_{a/s} + \boldsymbol{G_{s/e}} - Min\ [0,\ (G_a - G_{adj} - G_s)]]]*(P_{eff\text{-}I} - P)$ in case of (a) above,

The deviation between scheduled and actual Load consumption for Load i represented by Scheduling Coordinator j in Zone x during Trading Interval t is calculated as follows:

$$LoadDev_i = L_s - \left[\left(L_a - L_{adj}\right) + L_{a/s} + L_{s/e}\right] - UnavailDispLoadMW_{ixt}$$

Where;

$UnavailDispLoadMW_{ixt} = Max[0,\ (L_{i,\ oblig} - L_{a/s}) - L_a]$

$LoadDevC_i = LoadDev_i * P$ in case of (b) above, and

If $L_{a/s} + L_{s/e} > 0$ and $P < P_{eff}$ then:

$ASSELoadDevC_i = Max[0,[L_{a/s} + \boldsymbol{L_{s/e}} - Max[0,\ -(L_a - L_{adj} - L_s)]]]* (P_{eff\text{-}I} - P)$ in case of (a) above, or

If $L_{a/s} + L_{s/e} < 0$ and $P > P_{eff}$ then:

~~$ASSELoadDevC_i = Min[0,[L_{a/s} + L_{s/e} - Min[0, - (L_a - L_{adj} - L_s)]]]* (P_{eff-I} - P)$ in case of (a) above~~

~~The deviation between forward scheduled and Real Time adjustments to Energy imports[1], adjusted for losses, for Scheduling Point q represented by Scheduling Coordinator j into zone x during **Trading Interval t Settlement Period t** is calculated as follows:~~

~~$ImpDev_q = I_s * GMM_{fq} — [(I_a — I_{adj}) *GMM_{ahq}] + I_{a/s}$~~

~~$ImpDevC_q = ImpDev_q * P$ in case of (b) above, and~~

~~If $l_{a/s} > 0$ and $P < P_{eff}$ then:~~

~~$ASSEImpDevC_q = Max[0,[l_{a/s} - Max[0, (l_a - l_{adj} - l_s)]]]* (P_{eff-q} - P)$ in case of (a) above, or~~

~~If $l_{a/s} < 0$ and $P > P_{eff}$ then;~~

~~$ASSEImpDevC_q = Min[0,[l_{a/s} - Min[0, (l_a - l_{adj} - l_s)]]]* (P_{eff-q} - P)$ in case of (a) above~~

~~The deviation between forward scheduled and Real Time adjustments to Energy exports[2] for Scheduling Point q represented by Scheduling Coordinator j from Zone x during **Trading Interval t Settlement Period t** is calculated as follows:~~

~~$ExpDev_q = E_s - (E_a - E_{adj})$~~

~~$ExpDevC_q = ExpDev_q * P$~~

~~The Hourly Ex Post Price applicable to uninstructed deviations in Settlement Period t in each zone will equal the Energy weighted average of the BEEP Interval charges in each zone, calculated as follows:~~

$$P_{xt} = \frac{(\sum_{ji} |MWh_{jix}| * BIP_{ix})}{\sum_{ji} |IMWh_{jix}|}$$

~~Where:~~

~~BIP_{ix} = BEEP Interval Ex Post Price~~

~~P_{xt} = the Hourly Ex Post Price in Zone x~~

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1 Note that this deviation is a difference between a forward Market value and a Real Time value. It is not inadvertent energy.

2 Note that this deviation is a difference between a forward Market value and a Real Time value. It is not inadvertent energy.

IIEC *jix* ***= the Instructed Imbalance Energy Charges for Scheduling Coordinator j for BEEP Interval i in Zone x***

IMWH *jix* ***= the Instructed Imbalance Energy for Scheduling Coordinator j for the BEEP Interval i in Zone x***

D 2.1.2 Instructed Imbalance Energy Charges on Scheduling Coordinators

The Instructed Imbalance Energy charge for Settlement Period t for Scheduling Coordinator j for Zone x is calculated using the following formula:

$$IIEC_j = IGDC_j + ILDC_j + IIDC_j$$

The instructed Generation deviation payment/charge is calculated as follows:

$$IGDCj = \sum_{gi} \frac{G_{gi} * P_i}{HBI}$$

The instructed Load deviation payment/charge is calculated as follows:

$$ILDCj = \sum_{Li} \frac{L_{Li} * P_i}{HBI}$$

The instructed import deviation payment/charge is calculated as follows:

$$IIDCj = \sum_{Ii} \frac{I_{Ii} * P_i}{HBI}$$

D 3.38 $IGDC_j$ - $

The total of instructed Generation deviation payments/charges for Scheduling Coordinator j in Settlement Period t.

D 3.39 $ILDC_j$ - $

The total of instructed Load deviation payments/charges for Scheduling Coordinator j in Settlement Period t.

D 3.40 $IIDC_j$ - $

The total of instructed import deviation payments/charges for Scheduling Coordinator j in Settlement Period t.

D 3.41 G_{gi} - MW

~~Instructed Energy for Generating Unit g during BEEP Interval i.~~

~~D 3.42 L_{Li} - MW~~

~~Instructed Energy for Load L during BEEP Interval i.~~

~~D 3.43 I_i – MW~~

~~Instructed Energy for import I during BEEP Interval i~~

~~D 3.44 P_i -- $/MWh~~

~~The BEEP Incremental Ex Post Price for BEEP Interval i if the net instructed Energy for resources is positive, or the BEEP decremental EX Post Price for BEEP Interval i if the net instructed Energy for resources is negative.~~

~~D 3.45 HBI – Number~~

~~The number (2-12) of BEEP Intervals in Settlement Period t.~~

~~D 3.46 $ReplObligRatio_{jxt}$ – fraction~~

$$ReplObligRatio_{jxt} = \frac{ReplOblig_{jxt}}{\sum_{j} ReplOblig_{jxt}}$$

~~where:~~

~~where:~~

~~$ReplOblig_{jxt}$ is the replacement reserve capacity obligation as defined in Appendix C section C3.67.~~

24. ~~TEMPORARY CHANGES RESPECTING PHYSICAL CONSTRAINTS ON SCHEDULES~~

~~24.1 Application and Termination~~

~~The temporary change, respecting physical constraints on Schedules, set out in Section 24.2 shall continue in effect until such time as the Chief Executive Officer of the ISO issues a Notice of Full-Scale Operations, posted on the ISO Internet "Home Page", at http://www.caiso.com, or such other Internet address as the ISO may publish from time to time, specifying the date on which this Section 24 shall cease to apply, which date shall be not less than seven (7) days after the Notice of Full-Scale Operations is issued.~~

~~24.2 Amendment to Schedules and Bids Protocol~~

~~SBP 2.3 The Generation section of a Balanced Schedule, and any associated Adjustment Bids, must accurately reflect the physical capability of each Generating Unit identified in the Schedule (including each Generating Unit's ability to ramp from one hour to the next). For example, a 500 MW Generating Unit specified with a ramp rate of 2 MW/min and an operating point of 100 MWh for the current operating hour is not physically capable of generating 300 MWh in the next operating hour. Likewise, Adjustment bids submitted for a Generating Unit, applicable to a particular operating hour, should be physically achievable within the applicable operating hour.~~

29 Temporary Changes to Payments for Regulation

29.1 Application

Notwithstanding any other provision of the ISO Tariff, the amendments to the ISO Tariff set forth in Section 29 shall continue in effect until such time as:

(a) the ISO has filed with FERC new, long-term changes to the ISO Tariff in regard to the ISO's Regulation auction to provide incentives to Market Participants to bid into the auction; and

(b) FERC has accepted for filing and made effective such new, long-term changes to the ISO Tariff in regard to the ISO's Regulation auction.

29.2 ISO Tariff Amendments

29.2.1 Amendments to the Body of the ISO Tariff

2.5.27.1Regulation.

Regulation Up and Regulation Down payments shall be calculated separately.

Quantities. The following quantity definitions shall be used for each Scheduling Coordinator in the settlement process:

$AGCUpQDA_{xt}$ = the Scheduling Coordinator's total quantity of Regulation Up capacity in Zone X sold through the ISO auction, and scheduled Day-Ahead j for Settlement Period t.

$AGCDownQDA_{xt}$ = the Scheduling Coordinator's total quantity of Regulation Down capacity in Zone X sold through the ISO auction, and scheduled Day-Ahead j for Settlement Period t.

$EnQUnst_{xt}$ = Uninstructed Imbalance Energy increase or decrease in Zone X in real time Dispatch for Settlement Period t, determined in accordance with the ISO Protocols.

Prices. The prices in the Settlement process for Regulation Up and Regulation Down shall be those determined in Section 2.5.14.

Adjustment: penalty described in Section 2.5.26.1.

~~$PAGCUpDA_{xt}$ = the market clearing price, PAGC, in Zone X for Regulation Up capacity in the Day-Ahead market for Settlement Period t.~~

~~$PAGCDownDA_{xt}$ = the market clearing price, PAGC, in Zone X for Regulation Down capacity in the Day-Ahead market for Settlement Period t.~~

~~**Payments**. Scheduling Coordinators for Generating Units providing Regulation Up capacity through the ISO auction shall receive the following payments for Regulation Up:~~

~~$AGCUpPay_{xt} = AGCUpQDA_{xt} * PAGCUpDA_{xt} - Adjustment$~~

~~Scheduling Coordinators for Generating Units providing Regulation Down capacity through the ISO auction shall receive the following payments for Regulation Down:~~

~~$AGCDownPay_{xt} = AGCDownQDA_{xt} * PAGCDownDA_{xt} - Adjustment$~~

~~Scheduling Coordinators for Generating Units shall receive the following payment for Energy output from Regulation:~~

$$\sum_i [(EnQUnst_{ixt} * HourlyExPostPriceinZoneX) + REPA_{ixt}]$$

**~~$REPA_{ixt}$ = the Regulation Energy Payment Adjustment for Generating Unit i in Zone X for Settlement Period t calculated as follows:~~

~~$[(R_{UPixt} * C_{UP}) + (R_{DNixt} * C_{DN})] * max ($20/MWh, P_{xt})$~~

~~Where~~

~~R_{UPixt} = the upward range of generating capacity for the provision of Regulation from Generating Unit i in Zone X included in the bid accepted by the ISO for Generating Unit i for Settlement Period t, weighted in proportion to the ISO's need for upward Regulation. The weighting factors will be specified within a range from 0-100 percent. The weighting factors will be set at the discretion of the ISO based on system conditions, and will~~

be set at a level that will provide sufficient incentive to the market to supply upward Regulation for the ISO's purposes of satisfying WSCC criteria and NERC control performance standards. The ISO shall post the weighting factors consistent with the ISO Weighting Procedure, posted on the ISO website.

R_{DNixt} = the downward range of generating capacity for the provision of Regulation for Generating Unit i in Zone X included in the bid accepted by the ISO for Generating Unit i for Settlement Period t, weighted in proportion to the ISO's need for downward Regulation. The weighting factors will be specified within a range from 0-100 percent. The weighting factors will be set at the discretion of the ISO based on system conditions, and will be set at a level that will provide sufficient incentive to the market to supply downward Regulation for the ISO's purposes of satisfying WSCC criteria and NERC control performance standards. The ISO shall post the weighting factors consistent with the ISO Weighting Procedure, posted on the ISO website.C_{UP} = 1

C_{DN} = 1

P_{xt} = the Hourly Ex Post Price for Zone X in Settlement Period t.

The ISO may modify the value of the constants C_{UP} or C_{DN} within a range of 0-1 either generally in regard to all hours or specifically in regard to particular times of the day, after the ISO Governing Board approves such modification, by a notice issued by the Chief Executive Officer of the ISO and posted on the ISO Internet "Home Page," at http//www.caiso.com, or such other Internet address as the ISO may publish from time to time, specifying the date and time from which the modification shall take effect, which shall be not less than seven (7) days after the Notice is issued.

REPA shall not be payable unless the Generating Unit is available and capable of being controlled and monitored by the ISO Energy Management System over the full range of its Scheduled Regulation capacity for the entire Settlement Period at at least the ramp rates (increase and decrease in MW/minute) stated in its bid. In addition, the total Energy available (R_{UP} plus R_{DN}) may be adjusted to be only R_{UP} or only R_{DN}, a percentage of R_{UP} or R_{DN}, or the sum of R_{UP} and R_{DN}, depending on the needs of the ISO for each direction of Regulation service.

11.2.9.1Neutrality Adjustments

(d) amounts required with respect to payment adjustments for regulating Energy as calculated in accordance with Section 2.5.27.1. These charges will be allocated amongst the Scheduling Coordinators who traded on that Trading Day pro rata to their metered Demand (including exports) in MWh for that Trading Day.

29.2.2 Amendments to the Settlement and Billing Protocol

SABP 3.1.1. ADDITIONAL CHARGES AND PAYMENTS

(d)amounts required with respect to payment adjustments for regulating Energy as calculated in accordance with Section 2.5.27.1 of the ISO Tariff. These charges will be allocated amongst the Scheduling Coordinators who traded on that Trading Day pro rata to their metered Demand (including exports) in MWh for that Trading Day.

C 2.1.3 Real-Time Market

Each Scheduling Coordinator will be paid a Regulation Energy Payment Adjustment for real time incremental or decremental Energy provided from

Regulation resources as a result of the ISO's control of those resources. The payment for Scheduling Coordinator j for providing incremental or decremental Energy from resource i in Zone x for Trading Interval t is calculated as follows:

$REPA_{ijxt} = [(RUP_{ijxt} * CUP) + (RDN_{ijxt} * CDN)] * max ($20/MWh, P_{xt})$

REPA shall not be payable unless the Generating Unit is available and capable of being controlled and monitored by the ISO Energy Management System over the full range of its Scheduled Regulation capacity for the entire Settlement Period at at least the ramp rates (increase and decrease in MW/minute) stated in its bid. In addition, the total Energy available (R_{UP} plus R_{DN}) may be adjusted to be only R_{UP} or only R_{DN}, a percentage of R_{UP} or R_{DN}, or the sum of R_{UP} and R_{DN}, depending on the needs of the ISO for each direction of Regulation service.

C 2.2.5 Real-Time Market

(a) The ISO will charge the costs of purchasing Instructed Imbalance Energy output from Dispatched Spinning Reserve, Non-Spinning Reserve, Replacement Reserve and Supplemental Energy Resources through the Instructed Imbalance Energy settlement process.

(b) The ISO will charge the costs of purchasing Uninstructed Imbalance Energy (including incremental and decremental Energy from Generating Units providing Regulation) through the Uninstructed Imbalance Energy settlement process.

(c) The ISO will charge the costs of Regulation Energy Payment Adjustments as calculated in accordance with Section 2.5.27.1 of the ISO Tariff, in accordance with SABP 3.1.1(d).

C 3 Meaning of terms of formulae

C 3.20A $REPA_{ijxt}$ - $

The Regulation Energy Payment Adjustment payable for real time incremental or decremental Energy provided from Regulation resource i of Scheduling Coordinator j in Zone x in Trading Interval t.

C 3.20B RUP$_{ijxt}$ – MW

The upward Regulation capacity of Regulation resource i in Zone x included in the Final Schedule for Ancillary Services of Scheduling Coordinator j for Trading Interval t, weighted in proportion to the ISO's need for upward Regulation.

C 3.20C RDN$_{ijxt}$ – MW

The downward Regulation capacity of Regulation resource i in Zone x included in the Final Schedule for Ancillary Services of Scheduling Coordinator j for Trading Interval t, weighted in proportion to the ISO's need for downward Regulation.

C 3.20D CUP - number

The constant established by the ISO and subject to change by resolution of the ISO Governing Board. Initially this shall be set at 1. The ISO may modify the value of CUP within a range of 0-1 either generally in regard to all hours or specifically in regard to particular times of the day, after the ISO Governing Board approves such modifications, by a notice issued by the Chief Executive Officer of the ISO and posted on the ISO Internet "Home Page," at http//www.caiso.com, or such other Internet

address as the ISO may publish from time to time, specifying the date and time from which the modification shall take effect, which shall be not less than seven (7) days after the Notice is issued.

C 3.20E CDN – number

The constant established by the ISO and subject to change by resolution of the ISO Governing Board. Initially this shall be set at 1. The ISO may modify the value of CDN within a range of 0–1 either generally in regard to all hours or specifically in regard to particular times of the day, after the ISO Governing Board approves such modifications, by a notice issued by the Chief Executive Officer of the ISO and posted on the ISO Internet "Home Page," at http//www.caiso.com, or such other Internet address as the ISO may publish from time to time, specifying the date and time from which the modification shall take effect, which shall be not less than seven (7) days after the Notice is issued.

Amendments to the Master Definitions in the ISO Tariff.

Regulation Energy Payment Adjustment The additional value of regulating Energy.

AMENDMENT TO THE SCHEDULES AND BIDS PROTOCOL

SBP 5.1.1 Regulation

(j) bid price for regulating Energy ($/MWh) (required for validation of bid only).