IX. <u>Energy Imbalance Protocol</u>

1. Purpose

The purpose of this Protocol is to establish procedures for the accounting, after-the-fact trading and settlement for Energy Imbalance Services.

2. Parties

The Energy Imbalance Protocol applies to the following entities:

2.1   Scheduling Coordinators (SCs)

2.2   Control Area Operators (CAOs)

2.3   Utility Distribution Company(ies) (UDCs)

2.1   AZ ISA

3. Principles

3.1 Standard Offer SCs (SCs for bundled retail loads) will be treated somewhat differently than Competitive SCs during the transition period to 100% retail direct access in Arizona. It is intended that the Standard Offer SCs' unique benefits and burdens will neither advantage nor disadvantage them in the competitive marketplace during the transition period.

  3.1.1   Standard Offer SCs will not have the same metering requirements or Energy Imbalance burdens as Competitive SCs.

  3.1.2   Standard Offer SCs will have the burden of responsibility as "providers of last resort" or as the only providers of Energy Imbalance Services required for the CAOs to comply with WSCC reliability requirements.

3.2 All settlements for Energy Imbalance will be determined on an hourly basis.

3.3 Pricing of Energy Imbalance Service will be in accordance with Section 5.3 of this Protocol.

3.4 Settlement for Energy Imbalance Service will be in dollars.

3.5 Until a mechanism is in place for the trading of Energy Imbalances, settlement will be between the CAO and each Competitive SC. After a Trading Entity is formed and a mechanism is in place to provide for the trading of Energy Imbalances, the CAO will settle with the Trading

Entity. The costs associated with development and operation of the
Trading Entity will be recovered through the AZ ISA tariff.

3.6 If a Competitive SC's scheduled Retail Network Resource is located
within the CA and is equipped with properly functioning metering and
telemetering as required by the CAO for dynamic reads, and if the
owner of the Retail Network Resource has an interconnection
agreement with the CAO, then the output of this Retail Network
Resource can be treated as a Dynamic Schedule for the Competitive
SC's share of Retail Network Load within the CA. This Dynamic
Schedule would still be subject to final reconciliation of the billing
meters.

4. Energy Imbalance Service

Energy Imbalance Service supplies any mismatch between a Competitive
SC's Schedule and its share of Retail Network Load being served in the
CA.   This enables a settlement process that assigns payments or
penalties, or both, to compensate for mismatches. While Energy
Imbalance is principally a measurement for commercial settlement
purposes, it is important for system reliability. The CAO maintains the
system in balance on a real-time basis and can do so only to the extent
that all users of the transmission system provide accurate Schedules and
adhere to those Schedules. Consequently, Competitive SCs are
encouraged, through financial incentives, to maintain interchange
transactions accurately and to minimize Energy Imbalances. Energy
Imbalance is a measurement necessary to ensure that users do not lean
on the transmission system.

5. Basis for Energy Imbalance Charges

5.1 Each Competitive SC's hourly Energy Imbalance will be calculated as
the SC's [R_{Actual} - L_{Actual}], where:

5.1.1 R_{Actual} = the SC's actual Retail Network Resources
scheduled into the CA (includes integrated hourly generation
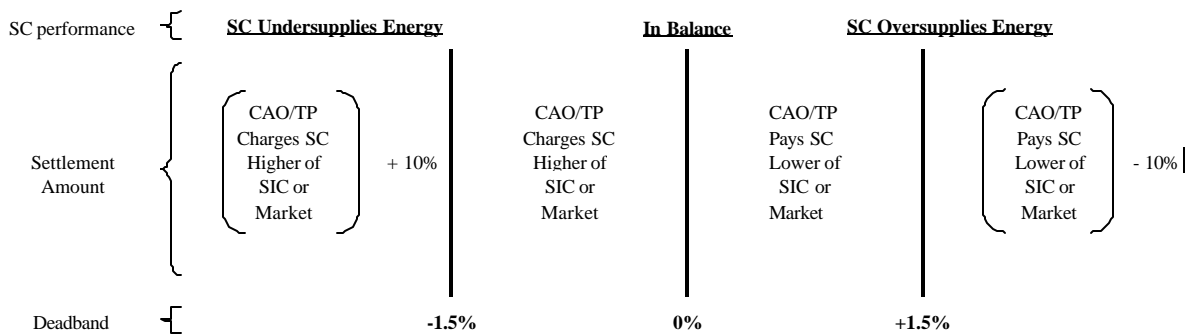within the CA plus imports from other CAs)

5.1.2 L_{Actual} = the SC's actual share of Retail Network Load within
the CA (integrated hourly demand for the SC's share of
Retail Network Load, based on both interval-metered Load
and load-profiled Load), including the CAO's applicable
calculated transmission and distribution losses.

5.2 Competitive SCs that have met their Operating Reserve obligations,
and whose imports into the CA and/or Retail Network Resources within
the CA are reduced due to unplanned forced curtailments, will not incur

Energy Imbalance penalties during the period prior to the first opportunity to update Schedules. Energy Imbalance for this period will be treated as being within the deadband, provided that the Competitive SC's Schedule(s) for the period of the unplanned curtailment fall within the deadband.

[There is an issue as to whether a deadband of 1.5% is appropriate for a retail market. It came from the OATT and was developed for wheelers, who have a much easier job of scheduling than retail SCs. I'd like to have a discussion about broadening the deadband somewhat.]

5.3 The basis upon which charges for Energy Imbalance Service charges were developed is shown below, where the deadband referenced is a percentage of the total Retail Network Load within the Control Area, including both Competitive SCs' and Standard Offer SCs' shares of total Retail Network Load:

SC performance	**SC Undersupplies Energy**		**In Balance**	**SC Oversupplies Energy**	
Settlement Amount	CAO/TP Charges SC Higher of SIC or Market	+ 10%	CAO/TP Charges SC Higher of SIC or Market	CAO/TP Pays SC Lower of SIC or Market	CAO/TP Pays SC Lower of SIC or Market	- 10%
Deadband	**-1.5%**		**0%**	**+1.5%**	

[The CAO paying the lower of SIC or market but receiving the higher of SIC or market is problematic. I suggest we drop SIC and do everything at market.]

The 1.5% deadband (with a 2 MW minimum deadband) will be applied to the collective imbalance of the Competitive SCs that are serving unbundled load. The CAO will charge the Trading Entity, which will in turn charge the collectively undersupplying Competitive SCs, the Market Price for Energy Imbalance within the deadband, and 110% of the Market Price for Energy Imbalance beyond the deadband. If the Competitive SCs collectively oversupply, the CAO must pay the Trading Entity, which will in turn pay the Competitive SCs, the Market Price for Energy Imbalance within the deadband and the Market Price less 10% for Energy Imbalance beyond the deadband

[The following section describes charging SC's for imbalance without the benefit of aggregation of the retail control area load. It should be deleted and replaced with the language above.]

~~If a Competitive SC undersupplies and its Energy Imbalance is within the aggregate 1.5% deadband, the CAO will charge the Trading Entity (see Section 6 of this Protocol), which will in turn charge the Competitive SC, the higher of the CAO's SIC or the Market Price. If a Competitive SC undersupplies and its Energy Imbalance is outside the deadband, the CAO will charge the Trading Entity, which will in turn charge the Competitive SC, the higher of the CAO's SIC or Market Price, plus ten percent (10%).~~

~~If a Competitive SC oversupplies and its Energy Imbalance is within the aggregate 1.5% deadband, the CAO will pay the Trading Entity, which will in turn pay the Competitive SC, the lower of the CAO's SIC or the Market Price. If a Competitive SC oversupplies and its Energy Imbalance is outside the deadband, the CAO will pay the Trading Entity, which will in turn pay the Competitive SC, the lower of its SIC or the Market Price, less ten percent (10%).~~

6. Trading of Energy Imbalance Accounts

6.1 Initial Features

Until the ~~Competitive SCs and other~~AZ ISA and market participants develop a Trading Entity for trading ~~their~~of Energy Imbalances, each CAO will perform Energy Imbalance settlement accounting with each Competitive SC using a combination of control area retail load data and individual SC data provided to the Competitive SCs. The CAO shall calculate hourly Energy Imbalances for individual Competitive SCs in accordance with its OATT. If the aggregate energy imbalance for retail load in the control area (including standard offer load) is less than or equal to 1.5% of the retail control area load, SC's will not incur energy imbalance penalties, regardless of their individual imbalances. If the aggregate energy imbalance for retail load in the control area (including standard offer load) is greater than 1.5% of the retail control area load, the CAO ~~and~~ shall charge the Competitive SCs for Energy Imbalance Service pursuant to the table in Section 5.3~~8~~ of this Protocol.

Payment to or from the CAOs for energy under or oversupplied by Competitive SCs will be in dollars.

6.2 Ultimate Features

Competitive SCs will be provided the opportunity to trade their Energy Imbalance accounts as part of the settlement process. A Trading Entity ~~may~~ will be established to be responsible for final Energy Imbalance settlement with the CAO on the net hourly Energy Imbalance for the Control Area. The Trading Entity will also be responsible for final settlements with the Competitive SCs for their respective allocations of the net hourly Energy Imbalance for the Control Area.

Procedures for the trading of Energy Imbalances among the Competitive SCs within the Trading Entity shall be developed by the ~~SCs under~~ SCs and the AZ ISA ~~oversight~~. ~~However, the Trading Entity will be separate from the AZ ISA and the Competitive SCs will be responsible for its costs.~~ Costs associated with the Trading Entity will be recovered through the AZ ISA tariff.

The Trading Entity will enter into an agreement with the CAOs to facilitate billing and settlement of Competitive SC Energy Imbalances. Pursuant to its agreement with the CAOs, the Trading Entity will be subject to the creditworthiness requirements under each CAO's respective OATT.

Payment to or from the CAOs for energy under or oversupplied by Competitive SCs will be in dollars.

7. Ultimate Features Energy Imbalance Calculation

Within sixty (60) days after the last day of the month, each CAO shall provide the following information to each Competitive SC and the Trading Entity for each hour of the month:

- the SC's share of Retail Network Load
- the SC's scheduled Retail Network Resources
- the SC's Energy Imbalance
- the CAO's net Control Area Energy Imbalance
- the ~~CAO's SIC and~~ the Market Price, and
- the CAO's "beyond the deadband" Energy Imbalance charge.

The process for calculating the amounts of Energy Imbalance over or undersupplied, both inside and outside the deadband, and allocation of each Competitive SC's applicable share of the hourly Energy Imbalance charges and/or penalties shall be determined as shown in the following example:

Example	Scheduled Load (MWh)	Actual Load (MWh)	Imbalance (Pre-Trade) (MWH)	Imbalance (Post-Trade) [1] (MWh)
SC_1	100	100	000	000
SC_2	500	700	(200)	(100)
SC_3	300	200	100	000
SC_4	004	001	003	003
Standard Offer SC	3,000	3,000	-	-
CAO	3,904 (sum of Competitive & Standard Offer SCs' & Schedules)	4,001 (including sale of Energy Imbalance to CAO)	(097)	(097)

The 1.5% Energy Imbalance deadband with a 2 MW minimum (based upon the FERC pro forma OATT) is calculated based on the total scheduled Retail Network Load within the Control Area: Energy Imbalance deadband = 1.5% * 3904 MWh of scheduled Retail Network Load ≈ 59 MWh.

This 59 MWh deadband will be applied to the collective imbalance of the Competitive SCs that are serving unbundled load: Total imbalance of SC_1 through SC_4 = 97 MWh. MWh of Energy Imbalance within the deadband = 59 MWh. MWh of Energy Imbalance beyond the deadband = [97 – 59] = 38 MWh.

As described in Section 5.3 of this Protocol, the CAO will charge the Trading Entity, which will in turn charge the collectively undersupplying Competitive SCs, the higher of the CAO's SIC or Market Price for Energy Imbalance within the deadband (in the above example, 59 MWh), and 110% of the higher of the CAO's SIC or Market Price for Energy Imbalance beyond the deadband (in the above example, 38 MWh). If the Competitive SCs collectively oversupply, the CAO must pay the Trading Entity, which will in turn pay the Competitive SCs, the SIC Market Price for

---

[1]This is just one possible outcome. It is not the most efficient one, but is used for simplicity in this example.

Energy Imbalance within the deadband and ~~SIC~~ the Market Price less 10% for Energy Imbalance beyond the deadband~~.~~.

If the ~~CAO's SIC~~ Market Price = \$20/MWh and "beyond the deadband" price = \$22/MWh, then the Trading Entity must pay the CAO {[\$20/MWh * 59MWh] + [\$22/MWh * 38MWh]} = \$2,016.[2]

Penalty charges (the "beyond the deadband" price) will be allocated pro rata only to those Competitive SCs whose post-trading Energy Imbalance accounts (column 5 of the Table) exceed the greater of: (i) ~~1~~2 MW or (ii) 1.5% of the Competitive SC's scheduled Retail Network Load.[3] Thus:

For Energy Imbalance provided/consumed:

- SC_2 pays the Trading Entity, which in turn pays the CAO:

    \$20/MWh * 100 MWh = \$2,000 for the extra energy consumed.

- SC_3 receives from the Trading Entity, which in turn receives from the CAO:

    \$20/MWh * 3 MWh = \$60 for the extra energy provided to the grid.

    For penalties at the "beyond the deadband" price, the total amount due the CAO is \$2/MWh * 38 MWh = \$76; and the total billing determinant is the sum of the following:

- 92.5 MWh (equal to SC_2's 100 MWh imbalance – 7.5 MWh (1.5% of SC_2's scheduled load of 500 MWh)); plus

- 2 MWh (equal to SC_3's 3 MWh imbalance – minimum ~~1 MW~~2 MW2 MW deadband); which equals

- 94.5 MWh.

    SC_2's pro rata share is [92.5/94.5 * \$76] and SC_3's pro rata share is [2/94.5 * \$76], for a total of \$76.

    Total payments to CAO = [\$2000 - \$60 + \$76] = \$2,016~~.~~.

    ~~Competitive SCs that participate in t~~The Trading Entity will be empowered to impose additional sanctions, upon approval of the AZ ISA Board and appropriate regulatory agencies, if the ~~Competitive SC group~~ Trading Entity determines that the Energy Imbalance pricing mechanism outlined above is not sufficient to incite reasonable scheduling and operation by certain Competitive SCs and that large Energy Imbalances are creating

---

[2]Alternatively, this could be viewed as purchasing all 97 MWh at the SIC of \$20, and paying a \$2 premium for the 36 MWh outside the effective deadband.

[3]~~The rationale for the 1 MW deadband is that 1 MW is the smallest increment in which schedules can be accepted, so it would be unreasonable to impose any penalties on imbalances of less than 1 MW.~~

burdens on the other Competitive SCs. [We will have to figure out a way to accomplish this – ie, complaints from competitive SC's about the scheduling behavior of another SC.]

8. Energy Imbalance Settlement ~~under the Initial Features or~~ for Stand-Alone Competitive SCs under the Ultimate Features

Under the Initial Features, and for Competitive SCs that choose not to participate in the trading of Energy Imbalance under the Ultimate Features, each CAO will perform Energy Imbalance settlement accounting with each Competitive SC as follows:

Within sixty (60) days after the last day of the month, each CAO shall provide the following information to each Competitive SC for each hour of the month:

- the SC's share of Retail Network Load
- the SC's scheduled Retail Network Resources
- the SC's Energy Imbalance
- the CAO's net Control Area Energy Imbalance
- the ~~CAO's SIC and~~ the Market Price, and
- the CAO's "beyond the deadband" Energy Imbalance charge.

Each CAO shall calculate hourly Energy Imbalances for individual Competitive SCs in accordance with its OATT and shall charge the Competitive SCs for Energy Imbalance Service pursuant to the following table. Under this stand-alone calculation, each Competitive SC will be allowed a 2 MW minimum deadband.

[Why wouldn't we do away with this matrix and the subsequent discussion entirely and charge stand-alone SC's based on the table in 5.3, with a 2 MW minimum deadband and penalties based on the individual SC load only, not the entire CAO retail energy imbalance???]

AISAA Stand-Alone Hourly Energy Imbalance Penalty Matrix
(Energy Imbalance Penalty Charge for Hours with Imbalance)

SC's Simple Monthly Average of the Absolute Value of Hourly Energy Imbalances
(Percent +/- of Energy Imbalance)

Hours Outside the Deadband During the Billing Month	1.5% - 3.0%	3.01% - 5.0%	5.01% - 10.0%	10.01% - 20.0%	20.01% - 35.0%	35.01% - 50.0%	> 50.01%
0-100 hrs	SIC/Mkt +/- 10%	SIC/Mkt +/- 10%	SIC/Mkt +/- 10%	SIC/Mkt +/- 10%	SIC/Mkt +/- 10%	SIC/Mkt +/- 10%	SIC/Mkt +/- 10%
101 - 200 hrs	SIC/Mkt +/- 11%	SIC/Mkt +/- 12%	SIC/Mkt +/- 14%	SIC/Mkt +/- 15%	SIC/Mkt +/- 20%	SIC/Mkt +/- 25%	SIC/Mkt +/- 30%
201 - 300 hrs /8.1/	SIC/Mkt +/- 12%	SIC/Mkt +/- 13%	SIC/Mkt +/- 15%	SIC/Mkt +/- 20%	SIC/Mkt +/- 25%	SIC/Mkt +/- 30%	SIC/Mkt +/- 35%
301 - 400 hrs /8.2/	SIC/Mkt +/- 14%	SIC/Mkt +/- 15%	SIC/Mkt +/- 20%	SIC/Mkt +/- 25%	SIC/Mkt +/- 30%	SIC/Mkt +/- 35%	SIC/Mkt +/- 40%
> 400 hrs /8.3/	SIC/Mkt +/- 15%	SIC/Mkt +/- 25%	SIC/Mkt +/- 35%	SIC/Mkt +/- 45%	SIC/Mkt +/- 55%	SIC/Mkt +/- 65%	SIC/Mkt +/- 75%

For hours in which the Competitive SC undersupplies, the CAO will calculate the penalty from the table above based upon the higher of the CAO's SIC or the Market Price. For hours in which the Competitive SC oversupplies, the CAO will calculate the penalty from the table above based upon the lower of the CAO's SIC or the Market Price.

The CAO will assess all hourly Energy Imbalance charges for the first 100 hours in the billing month outside the deadband according to row 1 penalties. The CAO will calculate the Competitive SC's average hourly Energy Imbalance for these 100 hours and charge the Competitive SC for each hour within these 100 hours at the rate in the applicable box. If the Competitive SC incurs more than 100 hours of Energy Imbalance during a billing month, then the CAO will assess the applicable penalties as shown on each successive row. For example, for a Competitive SC that incurs Energy Imbalances outside the deadband for 101-200 hours in the billing month, the CAO will assess the penalties shown on row 2, as appropriate for the average hourly Energy Imbalance percentage; for a Competitive SC that incurs Energy Imbalances outside the deadband for 201-300 hours in the billing month, the CAO will assess the penalties shown on row 3, as appropriate for the average hourly Energy Imbalance percentage; etc.

Note, it is intended that the CAOs apply and the Competitive SCs pay these penalty assessments in a progressive manner; i.e., a Competitive SC that has incurred 400 hours of Energy Imbalances outside the deadband during a billing month would not be charged the penalties

shown on row 5 for all 400 hours. The CAO would assess and the Competitive SC would pay the penalties on row 1 for its first 100 hours; the penalties on row 2 for the next 100 hours; penalties on row 3 for the next 100 hours; and so on.

However, for Competitive SCs that are chronic abusers that continually lean on others, a second tier of penalties will be assessed, as described in Sections 8.1 – 8.3 of this Protocol, below.

8.1 Competitive SCs that incur hourly Energy Imbalances for 3 consecutive months, or 6 months out of the previous 12 months, outside the deadband by 201-300 hours per month shall be assessed the penalties shown on row 3 for all hours 0-300 of Energy Imbalances outside the deadband. The CAO will continue to assess the second tier of penalties until the Competitive SC has demonstrated an effort to schedule accurately by not exceeding the deadband for more than 100 hours per month for 4 consecutive months.

8.2 Competitive SCs that incur hourly Energy Imbalances for 3 consecutive months, or 6 months out of the previous 12 months, outside the deadband by 301-400 hours per month shall be assessed the penalties shown on row 4 for all hours 0-400 of Energy Imbalances outside the deadband. The CAO will continue to assess the second tier of penalties until the Competitive SC has demonstrated an effort to schedule accurately by not exceeding the deadband for more than 100 hours per month for 4 consecutive months.

8.3 Competitive SCs that incur hourly Energy Imbalances for 3 consecutive months, or 6 months out of the previous 12 months, outside the band more than 400 hours per month, shall be assessed the penalties shown on row 5 for all hours of Energy Imbalances outside the deadband. The CAO will continue to assess the second tier of penalties until the Competitive SC has demonstrated an efforts to schedule accurately by not exceeding the deadband for more than 100 hours per month for 4 consecutive months.

8.4 Severity would be determined by the Competitive SC's average hourly Energy Imbalance for the hours 101-200.

9. Transmission and Distribution Loss Factors (TLFs and DLFs)

9.1   TLFs and DLFs will be calculated by the CAOs and UDCs and posted on or before the 15th day of the current month for the following month on each CAO's website.

9.2 TLFs will be system-wide and each UDC's DLFs may be voltage dependent.

10. Unaccounted-For Energy (UFE)

If the CAO calculates UFE hourly, then:

10.1   Each Competitive SC's Energy Imbalance account will be adjusted for UFE before it is provided to the Competitive SC for Energy Imbalance account trading. If the Competitive SC oversupplies during an hour in which the UFE is positive or if the Competitive SC undersupplies during an hour in which the UFE is negative (i.e., the Competitive SC helps to reduce the UFE problem), then the CAO will adjust the Competitive SC's Energy Imbalance account downward and will credit the Competitive SC's UFE account. Otherwise, no UFE account adjustments will be made.

10.2   The CAO will charge or credit UFE to the Competitive SC at the CAO's SIC.

11. Comparability

If the Standard Offer SC does not act as a passive provider of last resort and actively negotiates new agreements that do not qualify as standard offer and that are priced below the standard offer tariffs then:

11.1   With regard to scheduling for those customers, the Standard Offer SC shall be subject to the same scheduling requirements and Energy Imbalance provisions as Competitive SCs.

Standard offer tariffs include those approved by the ACC as Standard Offer agreements and SRP's Standard Price Plan including the Full Electric Service Requirement.

11.2   Disputes: Any disputes related to this comparability section shall be referred to the AZ ISA Director for resolution pursuant to ADR procedures outlined in the AZ ISA By-laws.