Appendix A

Unsecured Credit and Unsecured Credit Limits
Supplemental Information

Purpose:

This Appendix is intended to:

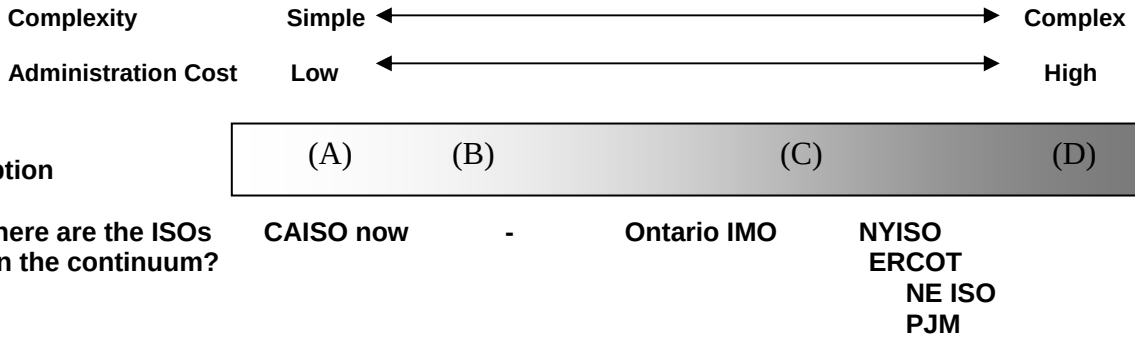
- Provide a list of alternative approaches to setting credit limits (Section I)
- Describe how other ISOs set credit limits (Section II)
- Establish criteria to choose from potential options (Section III)
- Evaluate potential options against the established criteria (Section IV)
- Illustrate how the CAISO recommended approach to setting credit limits would operate. (Section V)

This documented was updated on 9/30/2005. The last paragraph on page 11 had previously been omitted from the posted documented.

I. Alternatives Considered

The following alternative approaches to establishing credit limits (listed as Option A. to Option E.) can be viewed along a spectrum ranging from simple to more complex, with increasing support costs.

Characteristics



Option A: Status Quo, unlimited market credit with an Approved Credit Rating.

The credit limit is a "binary" approach. With an Approved Credit Rating, an entity is provided unlimited credit. Without an Approved Credit Rating, no credit is extended and all obligations must be backed with collateral.

Rating	Credit Limit
Long Term A-/A3 or Better, Short term A2/P2 or better, or State or Federal Government backed obligations	unlimited

Option B: Tiered credit limits based on national credit rating agency (S&P / Moody's / Fitch) ratings .

Example (indicative only):

Rating	Credit Limit
AAA	$200 million
AA	$100 million
A	$50 million
BBB	$5 million

Such an approach is limited in that it does not consider the size of an entity.

Additional simple rules could be used as well, for example, a governmentally owned utility without a credit rating could receive $1 million in credit.

Option C: More Complex Tiered Credit Limits

Two enhancements from Option B are included here:

1. Consider entity size in the credit limit determination by including an entity's "tangible net worth" into the calculation.
2. Consider other third party credit ratings in addition to the ratings by the national credit rating agencies (S&P / Moody's / Fitch).

Either of those enhancements could be used independently, and other alternatives are possible. Several options were considered by the CAISO internal team, but for the sake of brevity, only the recommended option is listed here. The following discussion incorporates both of these enhancements.

Description:

We propose using a Combined Third-Party Default Probability (CTPDP) as the credit risk metric to determine an allowable percentage of an entity's tangible net worth. The Combined Third-Party Default Probability [1] would be comprised of a blend of the default probability associated with the relevant Moody's, Standard & Poor's, or Fitch rating with another default probability such as from Moody's KMV. Moody's KMV maintains a proprietary default probability model that provides an alternate, potentially more timely view of the default probability of entities it rates. For example, we might use the following approach:

Combined Third Party Default Probability (CTPDP)	% [2] Tangible Net Worth	Tangible Net Worth (TNW)	Unsecured Credit Limit (UCL)
.03	7%	$W million	.07 * W
.06	3.5%	$X million	.035 * X
.12	1.75%	$Y million	.0175 * Y
.24	.9%	$Z million	.009 * Z

Section V of this Appendix provides a detailed example of how this approach might be developed/utilized.

Option D: Internally conduct a full credit assessment on every scheduling coordinator to establish its credit limit, using an agreed-upon credit scoring methodology.

A credit score would be developed by assessing various measures from a financial statement review, agency credit ratings, payment history, and other factors. The measures would be assigned and weighted according to predefined standards, but might also include a subjective assessment.

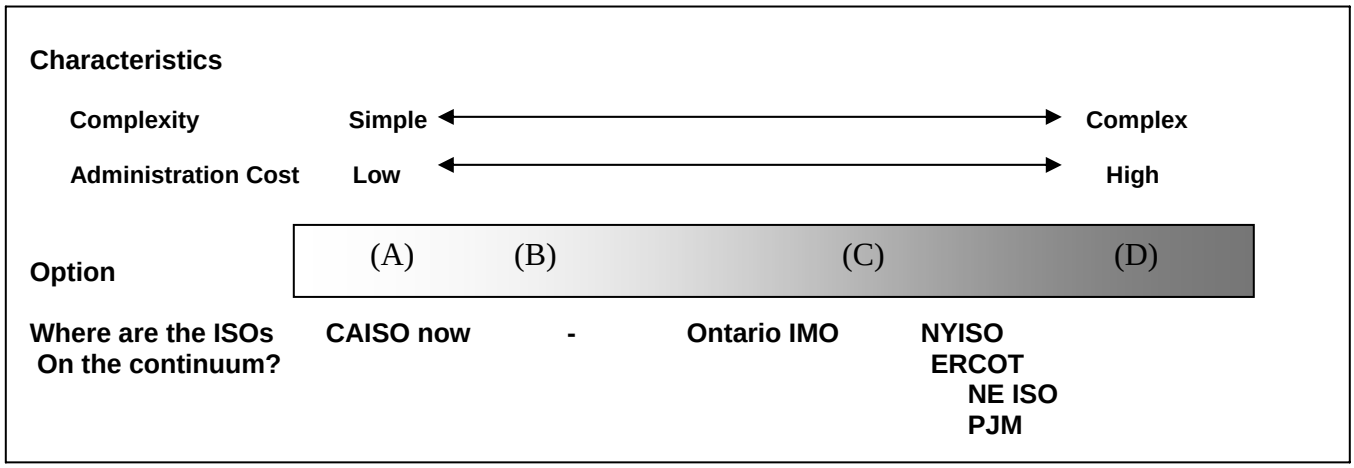
[1] The option described here includes the use of Moody's KMV (MKMV) default probabilities, in conjunction with the default probabilities associated with traditional Agency Ratings, to arrive at the Combined Third Party Default Probability. Including the MKMV forward looking default probabilities will give the participants early indications of improving and deteriorating credit worthiness as well as provide more SC coverage. The Combined Third-Party Default Probability will be a 50%/50% weighting of the default probability associated with the Agency Ratings (S&P/Moody's/Fitch) and with the Moody's KMV default probability.

[2] The % of TNW would decrease proportionally as the default probability increased. For example, the % of TNW would be approximately half as much for a firm with a .24% chance of default as a firm with a .12% chance of default.

For example:

Tangible Net Worth	ISO Assessed Credit Score	Adjustment Factor	Credit Limit
$X million	90-100	100%	X * 1.00
	80-89	75%	X * .75
	70-79	50%	X * .50
	60-69	35%	X * .35

II. Practices at other ISOs



IMO – sets a maximum trading limit for each participant, and the amount of security posted is dependent on credits provided to participants. The credits are based on each participant's credit rating, payment history and local distribution company transactions. It does not appear that IMO conducts credit scoring. Credit watch warnings automatically trigger a one-category reduction in the credit rating.

- Evaluation Frequency: Each participant provides a self-assessment of credit exposure to the IMO, and the IMO compares the self-assessment amount against actual transactions. Each participant can create a new self-assessment at any time, and the IMO will conduct a participant reevaluation if the participant ever defaults on its market obligations.

NYISO – uses a combination of investment grade credit ratings and credit analysis / scoring. Those participants with investment grade credit ratings are allowed unsecured credit up to a maximum percentage of their tangible net worth. This is considered the base amount. The NYISO then conducts a credit analysis to determine the amount of adjustment that should be applied to the base unsecured credit. Those participants that receive the highest credit score are allowed 10 percent more unsecured credit, other participants either retain the base unsecured amount or are subject to a reduced unsecured amount. No participant can have unsecured credit in an amount greater than 20 percent of all outstanding market charges (considered a Market Cap). Security requests for less than $10,000 are not addressed. NYISO maintains a credit staff of 4-5 individuals.

- Evaluation Frequency: The market participant must provide year-end statements "90 days after the end of each fiscal year and shall provide quarterly statements within 60 days of the end of each quarter".

ERCOT – uses a combination of credit rating and credit scoring to develop the amount of unsecured credit. Those participants with investment grade credit ratings and minimum shareholder equity of $100,000,000 are provided unsecured credit up to a maximum amount. The actual amount of unsecured credit depends on other credit analysis conducted. Municipal utilities and other participants that do not have credit ratings are subject to credit worthiness scoring and unsecured credit is provided accordingly.

- Unknown

NEISO – uses a combination of investment grade credit ratings and credit analysis / review process. Those participants that do not have an approved credit rating or cannot prove financial viability must post security. There does not appear to be a specific set of rules on how unsecured limits are set, but their tariff does refer to satisfying NEISO's credit review process.

- Evaluation Frequency: Within 10 days of NEPOOL request or upon a material change in the market participant's financial position. Participant 8-k reports must be submitted promptly upon their issuance.

PJM – bases the amount of unsecured credit on each participant's calculated credit score and tangible net worth. Participants with investment grade long-term credit ratings are given a credit score based on the rating. Other unrated participants can submit financial information and PJM will calculate a credit score. The credit score determines the maximum percentage of the participant's tangible net worth that is available as unsecured credit. The maximum unsecured credit that a participant can receive is $150 million. It provides for a working credit limit of 85% of the total of secured and unsecured credit (some "cushion" is required between the credit limit and obligations.)

- Evaluation Frequency: "On at least an annual basis, PJM will perform follow-up credit evaluations on all Participants / Members."

III. Assessment Criteria

The alternatives considered were assessed against the following criteria.

1. Initial and ongoing complexity and cost
   a. Implementation / administrative complexity
   b. New headcount requirement
   c. Estimated implementation costs
2. Level of subjectivity / objectivity
3. Subject matter expertise required
4. Used at other ISOs?
5. Advantages compared to other methods
6. Disadvantages compared to other methods

IV: Evaluation of Alternatives

Option A: Status Quo, unlimited market credit with an Approved Credit Rating.

1. **Initial and ongoing complexity and cost**
   a. **Implementation / administrative complexity** – none
   b. **New headcount requirement** – 0
   c. **Estimated implementation costs** – $0
2. **Level of subjectivity / objectivity –** Highly Objective
3. **Subject matter expertise required** – No
4. **Used at other ISOs?** – No
5. **Advantages compared to other methods**

a. Objective
b. Already implemented

6. **Disadvantages compared to other methods**

a. Other ISOs do not allow unlimited unsecured credit
b. Increased market risk to creditors
c. Not considered a viable option due to potential for bankruptcy of highly rated entities
d. Not considered an industry "best practice"

Option B **- Tiered credit limits based on national credit rating agency (S&P / Moody's / Fitch) ratings .**

1. **Initial and ongoing complexity and cost**

a. **Implementation / administrative complexity** – Low, once tiers are agreed to

b. **New headcount requirement** – 0

c. **Estimated implementation costs** – Depends on the amount of support required to substantiate the methodology. If developed internally, the cost should be minimal. If outside help is required, the cost may be as high as $100,000.

2. **Level of subjectivity / objectivity –** Developing the tiers would be somewhat subjective, however once implemented, the method will be highly objective—no discretion or interpretation would be involved.

3. **Subject matter expertise required** – Possibly for implementation, but not for ongoing use.

4. **Used at other ISOs?** – It is implemented at other ISOs, but usually as the first step in a longer process that takes into consideration other entity specific factors.

5. **Advantages compared to other methods**

a. Once implemented, establishes objective cap on unsecured amounts
b. Relatively easy to maintain and utilize
c. Headcount requirements remain low
d. Moving toward a best practice solution
e. Cost of use is low
f. Improved credit risk management

6. **Disadvantages compared to other methods**

a. The tiers don't consider different entity sizes and financial capacity.
b. Slow to respond to changing market conditions and credit warnings that may not be published by the rating agencies in a timely manner

Option C: More Complex Tiered Credit Limits

The recommended approach considers an entity's "tangible net worth" and other third party credit ratings in addition to the ratings by the national credit rating agencies (S&P / Moody's / Fitch).

1. **Initial and ongoing complexity and cost**

a. **Implementation / administrative complexity** – Low to moderate

b. **New headcount requirement** – 0

c. **Estimated implementation costs** – $100,000 - $175,000 ongoing annual cost.

2. **Level of subjectivity / objectivity –** This method could be designed with no subjectivity by the CAISO, the Credit Rating will be the blended ratings from 3rd Party Rating Agencies and Moody's KMV (MKMV) quantitative models

3. **Subject matter expertise required** – Yes – the ISO would hire the third party firm with expertise in this area.

4. **Used at other ISOs?** – Not as proposed here. The IMO uses Agency Ratings (unblended) and other ISOs add internal credit scoring to adjust Limits.

5. **Advantages compared to other methods**

    a. Establishes cap on unsecured amounts, based on third party assessments, and considers entity size.
    b. Relatively easy to administer
    c. No CAISO headcount increase
    d. Moving toward a best practice solution
    e. Improved credit risk management by incorporating leading indicators (MKMV quantitative ratings) into the credit risk assessment
    f. Using additional credit rating models/processes beyond the agency ratings will provide better access to credit for creditworthy firms that do not have an agency rating.

6. **Disadvantages compared to other methods**

    a. Although a combined rating agency and MKMV quantitative rating should provide the benefits associated with detecting credit changes early, the established limits might be more volatile.
    b. MKMV ratings are not available for every participant (municipal utilities and small entities).

Option D: Internally conduct a full credit assessment on every scheduling coordinator to establish its credit limit, using an agreed-upon credit scoring methodology.

1. **Initial and ongoing complexity and cost**

    a. Implementation / administrative complexity – This approach would be the most complex to implement and manage, especially if the credit assessment is conducted on every participant.

    b. New headcount requirement – 2-3

    c. Estimated implementation costs – $300,000 to $500,000

2. **Level of subjectivity / objectivity** – The degree of subjectivity / objectivity will depend on the implemented assessment methods, however this method would likely be the most subjective.

3. **Subject matter expertise required** – Yes-significant

4. **Used at other ISOs?** – No, though some use internal credit assessment and third party credit ratings to some degree.

5. **Advantages compared to other methods**

    a. Implements a cap on unsecured amounts
    b. Moving toward a best practice solution
    c. Improved credit risk management

6. **Disadvantages compared to other methods**

    a. Higher costs and head count

b. Highest degree of subjectivity
c. Potentially complex and difficult to manage
d. Potentially less transparency to market participants.

V. CAISO Recommended Approach Explanation

Unsecured Credit Limit Calculation for Rated / Unrated Public / Private Corporations and Rated Governmental Entities

A seven-step process is used to determine an entity's Unsecured Credit Limit (UCL):

Step 1 – If the SC has a credit rating / ratings from one or more of the "Nationally Recognized Statistical Rating Organizations"[3] (NRSRO), verify the rating / ratings with the appropriate NRSRO.

Step 2 - Calculate the SC's Average Rating Default Probability (ARDP).

a. ARDP = Sum(Agency Rating Default Probabilities) / Count(Agency Rating Default Probabilities)

b. The following table shows the median default probability calculated by MKMV for Standard & Poor's and Moody's long-term credit rating classes. Default probabilities will be obtained from each NRSRO.

c. The example presented below uses the following table to derive the ARDP.

AGENCY RATING DEFAULT PROBABILITIES (DP)

Based on 5 year historical median of Moody's KMV EDFs*

Maximum % of Tangible Net Worth	7.5%
Default Probability for Max TNW Calculation	0.11%

Moody's	DP	% of TNW	S&P	DP	% of TNW
Aaa	0.03%	7.50%	AAA	0.03%	7.50%
Aa1	0.05%	7.50%	AA+	0.06%	7.50%
Aa2	0.07%	7.50%	AA	0.09%	7.50%
Aa3	0.10%	7.50%	AA-	0.12%	6.88%
A1	0.15%	5.50%	A+	0.16%	5.16%
A2	0.22%	3.75%	A	0.22%	3.75%
A3	0.28%	2.95%	A-	0.28%	2.95%
Baa1	0.35%	2.36%	BBB+	0.36%	2.29%
Baa2	0.43%	1.92%	BBB	0.45%	1.83%
Baa3	0.56%	1.47%	BBB-	0.65%	1.27%
Ba1	0.73%	1.13%	BB+	0.93%	0.89%
Ba2	0.95%	0.87%	BB	1.34%	0.62%
Ba3	1.39%	0.59%	BB-	2.08%	0.40%
B1	2.04%	0.40%	B+	3.23%	0.26%
B2	2.99%	0.28%	B	5.05%	0.16%
B3	5.63%	0.15%	B-	7.97%	0.10%
Caa1	10.61%	0.08%	CCC+	12.62%	0.07%
Caa2	17.00%	0.05%	CCC	14.00%	0.06%
Caa3	20.00%	0.04%	CCC-	16.70%	0.05%
Ca	20.00%	0.04%	CC	17.00%	0.05%
C	20.00%	0.04%	C	18.25%	0.05%
			D	20.00%	0.04%

* Table to be updated each January 31.

[3] Designated by the U.S. Securities & Exchange Commission - http://www.sec.gov/answers/nrsro.htm

d. Issuer ratings without the benefit of credit enhancement would be used in this assessment. If an entity had a "senior long-term unsecured rating" instead of an issuer rating, the default probability for the rating one notch riskier would be used (as obligations to the ISO have a lower claim priority than senior unsecured debt).

Step 3 – Using MKMV's CreditEdge or RiskCalc software, obtain the participant's MKMV Default Probability (MKDP).

a. Since MKMV calculates default probabilities directly, the MKMV default probability would be used without any mapping.

Step 4 – Calculate a Combined Default Probability (CDP) based on one of the following methodologies:

a. CDP for Rated Public / Private Corporations = ARDP*50% + MKDP*50%

b. CDP for Unrated Public / Private Corporations = MKDP*100%

c. CDP for Rated Governmentally Owned Utilities = ARDP*100%

Step 5 – Calculate the SC's Tangible Net Worth Percentage[4] (TNWP).

TNWP = MTNWP * BDP / CDP

Where

MTNWP = Maximum Tangible Net Worth Percentage allowed, which currently equals 7.5 percent;

BDP = Base Default Probability, which currently equals 0.11 percent;

CDP = see Step 4 above; and

TNWP = 0 percent if the SC's CDP > 3.0 percent

Step 6 – Calculate the SC's Tangible Net Worth or Net Assets.

a. TNW for Rated / Unrated Public / Private Corporations = Assets minus Intangibles, such as Good Will, minus Liabilities.

b. NA for Rated Governmentally Owned Utilities = Total Assets minus Total Liabilities.

Step 7 – Calculate the SC's Unsecured Credit Limit.

a. UCL = TNW or NA * TNWP

[4] The maximum TNW percentage is 7.5% for the highest quality firms; that is those with a CDP of 0.11 percent or less. The maximum TNW percentage for those entities with the highest credit ratings is consistent with Table K1 in Attachment K of the NYISO's Tariff. The TNW percentage a SC qualifies for will be reduced as its credit risk increases.

Example:

Calculate the SC's Average Rating Default Probability

If an SC had a Moody's long-term rating of Baa2 and a Standard & Poor's long-term rating of BBB+, its Average Rating Default Probability would be calculated as (0.43% + 0.36%) / 2, or 0.40%.

Calculate a Combined Default Probability

If the SC has an 0.44% MKMV default probability, the Combined Default Probability would be (50%*0.40%)+(50%*0.44%)= 0.42%

Calculate the SC's Allowable Tangible Net Worth Percentage

TNWP = 7.5% x .11% / 0.42% = 1.96%

Calculate the SC's Tangible Net Worth and Unsecured Credit Limit

1. Allowable % of Tangible Net Worth	2. Tangible Net Worth (TNW) $s in (,000)	3. Unsecured Credit Limit $s in (,000)
1.96%	Tangible Assets $192,100 Total Liabilities $38,000 TNW $154,100	$154,100 * 1.96% = $3,020

Unsecured Credit Limit Calculation for Unrated Governmentally Owned Utilities

We propose to provide Unrated Governmentally Owned Utilities unsecured credit based on the ERCOT[5] model (see Section 16.2.5.1.1 of the ERCOT Tariff). These entities must meet the minimum Times Interest Earned (TIER)[6], Debt Service Coverage (DSC) and Equity to Assets ratios. The initial minimum ratios are TIER = 1.05, DSC = 1.00 and Equity to Assets = 0.15.

1. TIER = (Long-Term Debt Interest Expense + Change in Net Assets) / Long-Term Debt Interest Expense

2. DSC = (Depreciation & Amortization Expense + Long-Term Debt Interest Expense + Change in Net Assets) / Debt Service Billed (Debt Service Interest and Principal).

3. Equity to Assets = Total Equity / Total Assets

For those Municipals that meet all of the above criteria, initial unsecured credit is calculated as 0 percent to 5 percent of Net Assets (Total Assets minus Total Liabilities). The percentage of Net Assets provided will be established at the discretion of the CAISO. However, our initial thought is Municipals that meet the minimum ratios would receive 5 percent of Net Assets as unsecured credit unless there is a serious cause for concern (i.e. negative news regarding the entity's operations).

[5] The ERCOT model is based on a joint effort between itself and municipal and cooperative participants.

6 The initial minimum TIER and DSC ratios are derived from the Code of Federal Regulations for Rural Utilities Services (7 CFR – Chapter XVII – Part 1710). The TIER and DSC calculations have been reviewed by the CAISO and modified to reflect better market participant's financial requirements (i.e. substitution of Patronage Capital or Margins with Change in Net Assets).