Protocol Disclaimer

This presentation provides a general overview of the Texas Nodal Market and is not intended to be a substitute for the ERCOT Protocols, as amended from time to time. If any conflict exists between this presentation and the ERCOT Protocols, the ERCOT Protocols shall control in all respects.

For more information, please visit:

http://www.ercot.com/mktrules/nprotocols/
• Restrooms
• Refreshments
• Attendance sheet
• Questions

Please turn off cell phones & other electronics
Course Introduction
Course Audience

• This course is intended for personnel responsible for meeting ERCOT creditworthiness requirements at their companies.

• Includes companies registered as Qualified Scheduling Entities and CRR Account Holders
Upon completion of this course, you should be able to:

- Describe the impacts of common business activities on credit exposure
- Define the types of Financial Security acceptable to ERCOT
- Illustrate how ERCOT calculates Available Credit Limits
- Summarize the credit management processes in ERCOT’s markets
- Locate and utilize various credit reports from the Market Information System.
Modules in this course include:

1. Overview
2. Establishing and Maintaining Creditworthiness
3. Credit Exposure from Market Activities
4. Determining Available Credit Limits
5. Credit Processes
6. MIS Credit Reports
Module 1
Overview
Topics in this module ...

• The ERCOT Market Environment
  • Qualified Scheduling Entities
  • CRR Account Holders
• The Counter-Party
• Creditworthiness requirements
• Allocation of credit by Counter-Party
The ERCOT Market Environment

Qualified Scheduling Entities
- Settle financially with ERCOT
- Must meet creditworthiness requirements

* ERS-only QSEs are exempt from creditworthiness requirements
CRR Account Holders

- Settle financially with ERCOT
- Must meet creditworthiness requirements
Introducing ... The Counter-Party

- Entity that is also a QSE and/or a CRR Account Holder
- Responsible for meeting Creditworthiness requirements
A Counter-Party must maintain posted Financial Security at or above Total Potential Exposure minus Unsecured Credit Limit.
Total Potential Exposure (TPE)

- Estimated liabilities from various market activities
- Future Credit Exposure from Congestion Revenue Rights (CRRs)
• Based on ERCOT Creditworthiness Standards

• Determined from Counter-Party financial statements and credit ratings

• Updated periodically by ERCOT
• Collateral posted by Counter-Party
• ERCOT Protocols define the acceptable forms\(^1\)
Available Credit?

- Financial Security
- Unsecured Credit Limit
- Available Credit
- Total Potential Exposure (TPE)

Financial Security beyond minimum provides available credit for daily ERCOT market activities
Available Credit

Available Credit Limits are used in:

- Congestion Revenue Rights Markets (CRR Auction, CRR Trades)
- Day-Ahead Market (DAM)

Available Credit Limit Reports posted by ERCOT

- Calculated daily
  - Twice on business days
  - Once on weekends and holidays
- Posted to MIS\(^1\) Certified Area

\(^1\) Market Information System
Allocation of Credit

CRR Auction Credit Limit

Available credit is shared

CRR Account Holder

Counter Party

Maintains Financial Security with ERCOT

QSE

Day-Ahead Market Credit Limit
Module 2

Establishing and Maintaining Creditworthiness
Topics in this module ...

- Credit Application
- Financial statement requirements
- Setting a Counter-Party’s Unsecured Credit Limit
- Types of Financial Security
New QSE or CRR Account Holder?

• Establish initial values for credit calculations
• Post sufficient Financial Security

Where do I start?
Establishing Initial Values

- Calculated by ERCOT
- Based on data from Credit Application
Credit

In this section, find forms and documents used in evaluating Applicants and Counter-Parties for participation in the ERCOT administered market. Documents are also included that define parameters used in determining exposure.

Credit Application

Information required by ERCOT for the evaluation of credit for entities desiring to enter the ERCOT market.

DAM Proxy Settlement Points

Proxy Settlement Points are used to determine the DASPPs for Settlement Points that have been added post Nodal Go-Live, for CRR Exposure Calculation Purposes.

DAM Settlement Point Prices

Report contains Historical DAM Settlement Point Prices through 10/21/2013 for CRR Credit Exposure Calculation purposes. Price corrections are not reflected in the report.

The Letter of Credit Concentration Limits Report

The Letter of Credit Concentration Limits Report provides current available capacity for each Letter of Credit issuer based on concentration limits.
Requires estimates to calculate TPE:

- **Load**
  - Daily average MWhs
  - Percentage to be purchased in Real-time
  - Estimated number of ESI IDs

- **Generation**
  - Daily average MWhs
  - Percentage to be sold Bilaterally

![Total Potential Exposure (TPE)]
Submitting Credit Application

Requires Financial Statements as attachments

• Two years of annual statements, if available
  • Audited statements preferred
  • Unaudited or quarterly statements may suffice
• Subsequent quarterly statements helpful

Used to determine the Unsecured Credit Limit
In General,

- Total Assets
- Total Liabilities

Some percentage as Unsecured Credit Limit

Actual methodology varies by nature of company

- Publicly held
- Privately held
- Municipally-Owned Utility and Electric Co-operatives
For companies with Tangible Net Worth > $100 Million:

- Up to 3% as Unsecured Credit Limit if publicly rated
- Up to 1.8% as Unsecured Credit Limit if privately held and *not* publicly rated

Unsecured Credit Limit may not exceed $50 Million
Setting the Unsecured Credit Limit

For Municipally-Owned Utilities and Co-operatives:

- Tangible Net Worth < $100 Million, or
- Not publicly rated

Diagram:

- Total Assets
- Total Secured Debt
- Up to 5% as Unsecured Credit Limit
Types of Financial Security

- Guarantee Agreement
- Letter of credit
- Surety bond
- Cash deposit
Guarantee Agreement

• Provided from another entity

• Based on their Unsecured Credit Limit

Limited to $50 Million
• per Counter-Party
• per Guarantor

Guarantee

Financial Security

Unsecured Credit Limit

Unsecured Credit Limit
Types of Financial Security

- Guarantee Agreement
- Letter of credit
- Surety bond
- Cash deposit

Considered “Secured Collateral”
<table>
<thead>
<tr>
<th>Secured Collateral</th>
<th>Description</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter of Credit</td>
<td>• Unconditional</td>
<td>Subject to credit rating of issuer</td>
</tr>
<tr>
<td></td>
<td>• Irrevocable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Names ERCOT as beneficiary</td>
<td></td>
</tr>
<tr>
<td>Surety Bond</td>
<td>• Issued by insurance company</td>
<td>$10 Million per Counter-Party per issuer</td>
</tr>
<tr>
<td></td>
<td>• Names ERCOT as beneficiary</td>
<td></td>
</tr>
<tr>
<td>Cash Deposit</td>
<td>• Deposited in account designated by ERCOT</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>• May bear interest payable to Counter-Party</td>
<td></td>
</tr>
</tbody>
</table>
Counter-Party EZrisk submits a credit application. Based on the information provided, ERCOT determines the following:

- Total Potential Exposure = $12 Million
- Unsecured Credit Limit = $1 Million

**What is the minimum Financial Security the Counter-Party must post to enter the market?**

**Can EZrisk provide all their Financial Security with a single Surety Bond?**
Managing creditworthiness is an ongoing process

- Unsecured Credit Limit subject to change
- Total Potential Exposure changes with Market Activities
Unsecured Credit Limit subject to change

- Counter-Party’s financial condition may change
- Financial statements must be updated

Financial

Statement

Balance Sheet

Income

Cash Flows

- Annual audited
- Quarterly unaudited
Total Potential Exposure changes with Market Activities
Module 3

Credit Exposure from Market Activities
Topics in this module ...

• Review of Market Activities

• Details of Total Potential Exposure
  • Future Credit Exposure from owning Congestion Revenue Rights (CRRs)
  • Estimated Settlement exposure from various market activities
Market Activities – A Review
Market Transactions for Energy and Ancillary Services

- Bilateral Trades
- Day-Ahead Market
- Real-Time Market
Arranged between QSEs

- Energy Trades
- Ancillary Service Trades

Trade Settlements

- QSEs settle with each other
- Both QSEs must report trades to ERCOT to impact ERCOT Settlements
QSEs Participate in Day-Ahead Market (DAM)

- Buy and Sell Energy
- Sell Ancillary Services to ERCOT

**DAM Settlements**

- **Buyers**
  - Pay Day-Ahead Market price
  - Receive MW credit in Real-Time

- **Sellers**
  - Are paid Day-Ahead Market price
  - Incur MW obligation in Real-Time
Loads in Real-Time

- Are price takers
- Pay for energy not previously purchased through Trade or DAM

QSEs Representing Load

- Settled for difference between Real-Time Load and Trade or DAM transactions
- Settle with Load Serving Entities
Resources in Real-Time

- Set prices
- Are paid for energy not previously sold through Trade or DAM

QSEs Representing Resources

- Settled for difference between Real-Time production and Trade or DAM transactions
- Pay for infeasible Ancillary Services
- Settle with Resource Entities
Day-Ahead Market Settlement Statements

- Payments due
- Charges incurred
Real-Time Market Settlement Statements

- Payments due
- Charges incurred
Single Daily Settlement Invoice

Settlement Timelines

- **Invoice Day**
  - ERCOT Issues Invoice
    - DAM
    - RTM Initial
    - RTM Final
    - RTM True-up

- **Invoice Day + 2**
  - Payment Due to ERCOT

- **Invoice Day + 3**
  - Payment Due to Market Participant
Price separation across the grid exposes buyers and sellers of energy to **Congestion Costs**
Hedging Congestion Costs

**Congestion Revenue Rights (CRRs)**

- Financial instruments for hedging congestion costs in Day-Ahead Market
- Pay owner sink-minus-source price difference
Hedging Congestion Costs

Two Types of CRRs:

• **Point-to-Point Options** can only result in a payment

• **Point-to-Point Obligations** can result in a payment or charge
Three ways of acquiring CRRs:

- CRR Auction
- Allocation (Special Cases)
- Bilateral Trades
Auctions take place twice per month:

- Monthly Auction
- Long-Term Auction Sequence
  - Six successive auctions
  - Six-month windows
  - One window each month

*Exact dates on CRR Activity Calendar - http://www.ercot.com/mktinfo/crr*
CRRs are auctioned by:

- Source/Sink Settlement Point pair
- Month or strip of consecutive months
- Time-of-Use Blocks

<table>
<thead>
<tr>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
<th>Thurs</th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-Peak (0100 – 0600)</td>
<td>Peak Weekday (0700 – 2200)</td>
<td>Peak Weekend (0700-2200)</td>
<td>Off-Peak (0100 – 0600)</td>
<td>Peak Weekday (0700 – 2200)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CRR Auction Settlement Invoice

Settlement Timelines

Auction Completed

Day 1

ERCOT Posts Auction Results

ERCOT Issues Auction Invoice

Day 4

Day 5

Payment Due to ERCOT

1700

1700

Payment Due to CRR Account Holder
Total Potential Exposure
Two Flavors of Total Potential Exposure

- **Trades**
- **DAM**
- **Real-Time**
- **CRRs**

**Total Potential Exposure Any**
- May be satisfied by any form of Financial Security or Unsecured Credit

**Total Potential Exposure Secured**
- Must be satisfied by Secured Collateral
Total Potential Exposure Secured
Total Potential Exposure Secured

**TPES** includes the Future Credit Exposure of Congestion Revenue Rights owned by a CRR Account Holder.

- Trades
- DAM
- Real-Time
- CRRs

*May also include an Independent Amount for capitalization*
Future Credit Exposure for CRRs

- Based on historical valuation
- Different methodology for options and obligations

\[ \text{FCE} = \text{FCEOPT} + \text{FCEOBL} \]

- Projected over current month and all future months
- Projected over current month and next month
Based on historical average prices

Each path has its own value

Value = NAOPTMW * A

Where

NAOPTMW = Net Awarded PTP Options for source-to-sink path

A = Path-Specific DAM-Based Adder (price)
Path-Specific Adder

• Calculated for each source/sink pair
• Three year look-back

ci99 = 99th percentile Confidence Interval
Future Credit Exposure for PTP Options (FCEOPT)

FCEOPT = \(- \sum[N\cdot A_{OPTMW} \cdot \text{Max}(0, A_{ci_{99}})]\)

Summed over

- All source/sink pairs
- Remaining TOU hours of current month
- TOU hours of next month (Prompt Month)
Counter-Party EZrisk owns PTP Options on two paths.

- **Path P1:**
  - 40 MW Peak Week-day
  - $\text{Ac}\text{i}99 = \$0.05/\text{MWh}$

- **Path P2:**
  - 10 MW Peak Week-day
  - $\text{Ac}\text{i}99 = \$0.10/\text{MWh}$

There are 80 Peak WD hours left in the current month and 320 Peak WD hours next month.

*What is EZrisk’s FCEOPT?*
Example 1

Working Space

Calculating Future Credit Exposure for PTP Options

\[
\text{FCEOPT} = - [(40 \text{MW} \times $0.05/\text{MWh} \times 400 \text{h}) + (10 \text{MW} \times $0.10/\text{MWh} \times 400 \text{h})]
\]

\[
= -[$800 + $400]
\]

\[
= -$1200
\]

**Bonus Question:** What does a negative exposure mean?
Portfolio Weighted Adder (PWA)

- Volume-weighted average price
- Based on historical CRR path values

- OR -

Portfolio Weighted Auction Clearing Price (PWACP)

- Volume-weighted average price
- From most recent Auction

. . . whichever results in highest risk
Portfolio Weighted Adder (PWA)

- Monthly average price
- Three-year look-back

$\text{ci100} = 100\text{th percentile Confidence Interval}$
Future Credit Exposure for PTP Obligations (FCEOBL)

FCEOBL = \sum [\text{NAOBLMW} \times (-\text{Min}(0, PWA_{ci100}, PWACP))]}

Where NAOBLMW = Net Awarded PTP Obligations for Portfolio

Summed over
- All hours of current month
- All hours of next month (Prompt Month)
- All hours of Forward Months
Counter-Party EZrisk owns PTP Obligations for the current and upcoming months. All their PTP Obligations have had slightly positive values in DAM for the past three years.

In the most recent monthly auction, several PTP Obligation paths cleared at slightly negative prices.

- PWA = $0.0938
- PWACP = ($0.1012)

Does EZrisk have a Future Credit Exposure from these PTP Obligations?
Putting it all together,

\[ \text{FCE} = \text{FCEOPT} + \text{FCEOBL} \]

Credit for PTP Options offsets the exposure of PTP Obligations
Total Potential Exposure Secured

TPES = Max [0, FCE] + IA
Participation in all markets

- $10 Million total assets, or
- $1 Million in
  - Unencumbered assets for Munis and Co-ops
  - Tangible net worth for all others

Participation in everything but CRR

- $5 Million total assets, or
- $500,000 in
  - Unencumbered assets for Munis and Co-ops
  - Tangible net worth for all others
If Counter-Party does not meet capitalization criteria, Independent Amount shall be

- $500,000 for participation in all markets
- $200,000 for participation in everything but CRR

ERCOT may also include an Independent Amount because of a material change in Counter-Party’s financial condition.
Example 2

Counter-Party EZrisk owns both PTP Obligation and Options.

At close of business today:

- FCEOPT = − $1200
- FCEOBL = $2600

EZrisk meets the capitalization criteria for participation in all markets.

What is EZrisk’s TPES?
Example 2

Working Space

Calculating Total Potential Exposure Secured

\[ \text{FCE} = \text{FCEOPT} + \text{FCEOBL} = -1200 + 2600 = 1400 \]

\[ \text{TPES} = \max[0, \text{FCE}] + \text{IA} = \max[0, 1400] + 0 = 1400 \]
Total Potential Exposure Any
Total Potential Exposure Any

TPEA is based on the settlement impact from various market activities.
Total Potential Exposure Any

(TPEA)

= QSE Estimated Aggregate Liability + CRRAH Estimated Aggregate Liability

+ Potential Uplift
Total Potential Exposure Any (TPEA) = Minimum Current Exposure + Potential Uplift

Estimated Aggregate Liability (EAL) is based on historical market behaviors
Total Potential Exposure Any (TPEA) = Minimum Current Exposure + Potential Uplift

Minimum Current Exposure (MCE) creates a floor for credit exposure.
Total Potential Exposure Any (TPEA)

Potential Uplift (PUL) captures risk of market uplifts from short payments
Total Potential Exposure Any (TPEA) = Minimum Current Exposure + Potential Uplift
Two categories of QSE Estimated Aggregate Liability

- QSE Estimated Aggregate Liability (EAL_q)
- Counter-Parties with Load and/or Gen QSEs

- QSE Estimated Aggregate Liability (EAL_t)
- Counter-Parties with no Load and no Gen QSEs (Trade-Only)
Estimated Aggregate Liability for QSEs ($EAL_q$)

- Calculated for all QSEs represented by Counter-Party
- Addresses multiple types of risk
### A Couple of Multipliers

<table>
<thead>
<tr>
<th>Factors</th>
<th>Purpose</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>Projecting Future Risk</td>
<td>M1 = M1a + M1b</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M1a = Termination Time upon default</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 12 Days</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M1b = Mass Transition time for QSEs with Load</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 3 to 8 Days</td>
</tr>
<tr>
<td>M2</td>
<td>Estimating Current Risk</td>
<td>M2 = Maximum Operating Days complete, but unbilled</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 9 Days</td>
</tr>
</tbody>
</table>
Future Risk

- Operating Days yet to come
- Historical behaviors
- Historical and forward prices

QSE Estimated Aggregate Liability ($EAL_q$)

- Future Risk
- Current Risk
- MT Risk

Initial Estimated Liability (New CPs)
- or -
RFAF * Max Real-Time Liability Extrapolated
- or -
Real-Time Liability Forward

Max

DFAF * Day-Ahead Liability Extrapolated
Initial Estimated Liability (IEL)

- Based on estimates from Credit Application
- Daily Estimated Load (MWhs)
- Percentage to be purchased in Real-time
- Daily Estimated Generation (MWhs)
- Percentage to be sold bilaterally

Used during first 40 days of activity in ERCOT
## Future Risk

<table>
<thead>
<tr>
<th>QSE Type</th>
<th>Initial Estimated Liability (IEL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load</td>
<td>$IEL = \text{DEL} \times \text{Max } [0.2, \text{RTEFL}] \times \text{RTAEP} \times (M1 + M2)$</td>
</tr>
<tr>
<td>Resource</td>
<td>$IEL = \text{DEG} \times \text{Max } [0.2, \text{RTEFG}] \times \text{RTAEP} \times (M1 + M2)$</td>
</tr>
<tr>
<td>Load &amp; Resource</td>
<td>$IEL = \text{DEL} \times \text{Max } [0.1, \text{RTEFL}] \times \text{RTAEP} \times (M1 + M2)$ $+$ $\text{DEG} \times \text{Max } [0.1, \text{RTEFG}] \times \text{RTAEP} \times (M1 + M2)$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEL</td>
<td>Daily Estimated Load</td>
</tr>
<tr>
<td>RTEFL</td>
<td>Real-Time Energy Factor for Load</td>
</tr>
<tr>
<td>DEG</td>
<td>Daily Estimated Generation</td>
</tr>
<tr>
<td>RTEFG</td>
<td>Real-Time Energy Factor for Generation</td>
</tr>
<tr>
<td>RTAEP</td>
<td>Real-Time Average Energy Price (HB_HUBAVG)</td>
</tr>
</tbody>
</table>
Counter-Party EZrisk just entered the market.

- From their Credit Application:
  - Daily Estimated Load = 12,000MWh
  - Percentage Purchased in Real-Time = 50%
  - Daily Estimated Generation = 12,000MWh
  - Percentage sold Bilaterally = 50%

- Other information:
  - M1 = 16
  - M2 = 9
  - RTAEP = $40/MWh

What is EZrisk’s Initial Estimated Liability?
Example 3

Calculating Initial Estimated Liability (IEL)

\[\text{IEL} = \text{DEG} \times \max(0.1, \text{RTEFL}) \times \text{RTAEP} \times (M1 + M2) + \text{DEG} \times \max(0.1, \text{RTEFG}) \times \text{RTAEP} \times (M1 + M2)\]

\[= 12,000 \text{MWh} \times \max(0.1, 0.5) \times 40 \text{$/MWh} \times 25 + 12,000 \text{MWh} \times 0.5 \times 1000 \text{$/MWh}\]

\[= 12,000 \text{MWh} \times 0.5 \times 1000 \text{$/MWh} + 12,000 \text{MWh} \times 0.5 \times 1000 \text{$/MWh}\]

\[= 12,000,000\]

Working Space
Max Real-Time Liability Extrapolated (Max RTLE)

- Based on *actual* Real-Time Settlements
  - Average Initial Settlement
  - 14 calendar day lookback
  - Projected over M1 days
- Maximum risk over the previous 40 days
Real-Time Forward Adjustment Factor (RFAF)

Real-Time Pricing at North Hub

RFAF = \frac{\text{Forward Average Price}}{\text{Historic Average Price}} = 1.36

Historical Prices

Forward Prices

14 Days

21 Days
Real-Time Forward Adjustment Factor (RFAF)

Historical Prices

Forward Prices

Real-Time Pricing at North Hub

$\$/MWh

RFAF = \frac{\text{Forward Average Price}}{\text{Historic Average Price}} = 0.93

14 Days

21 Days

Historical Prices

Forward Prices

Today
Real-Time Liability Forward (RTLF)

- Based on estimated Real-Time Settlements
  - Net amount for most recent 7 Operating Days
    - Actual for some days
    - Estimates\(^1\) for others
  - Adjusted by 150%

\(^1\) See Protocol Section 16.11.4.3.2 for details
Day-Ahead Liability Extrapolated (DALE)

- Based on actual Day-Ahead Market Settlements
  - Average Day-Ahead Market Settlement
  - 7 calendar day lookback
  - Projected over M1 days
DAM Forward Adjustment Factor (DFAF)

DAM Pricing at North Hub

DFAF = \frac{\text{Forward Average Price}}{\text{Historic Average Price}} = 1.29

Historical Prices

Forward Prices

7 Days

21 Days

$/MWh

Today

Historical Prices

Forward Prices
DAM Forward Adjustment Factor (DFAF)

DAM Pricing at North Hub

\[
\text{DFAF} = \frac{\text{Forward Average Price}}{\text{Historic Average Price}} = 0.97
\]

Historical Prices

Forward Prices

Today
Counter-Party EZrisk has been in the market for five months.

- Initial Estimated Liability = $12 Million
- Real-Time Liability Extrapolated peaked at $3 Million twenty days ago
- Real-Time Liability Forward = $1 Million
- Day-Ahead Liability Extrapolated = ($500,000)
- Real-Time Forward Adjustment Factor = 1.05
- Day-Ahead Forward Adjustment Factor = 1.10

What is EZrisk’s future risk in the EAL calculation?
Example 4

Working Space
Current Risk

• Estimates risk of completed Operating Days where settlement is not complete
  • Unbilled
  • Billed but unpaid

• Based on historical behaviors

\[ \text{Max Unbilled Real-Time Amount} \]
\[\text{or}\]
\[\text{Real-Time Liability Completed and Not Settled} \]
\[+\]
\[\text{Outstanding Unpaid Transactions} \]

QSE Estimated Aggregate Liability (EAL\(_q\))

Future Risk

Current Risk

MT Risk
Max Unbilled Real-Time Amount (Max URTA)

- Based on actual Real-Time Settlements
  - Average Initial Settlement
  - 14 calendar day lookback
  - Projected over M2 days
- Maximum risk over the previous 40 days
Real-Time Liability Completed and Not Settled (RTLCNS)

- Based on estimated Real-Time Settlements
- Sum of net amounts for all Operating Days Completed but not Settled

Captures recent trends that diverge from historical results
Outstanding Unpaid Transactions (OUT)

\[
\text{OUT}_q = \text{OIA}_q + \text{UDAA}_q + \text{UFA}_q + \text{UTA}_q + \text{CARD}
\]

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>OIA</td>
<td>Outstanding Invoice Amounts</td>
</tr>
<tr>
<td>UDAA</td>
<td>Unbilled Day-Ahead Amounts</td>
</tr>
<tr>
<td>UFA</td>
<td>Unbilled Final Amounts</td>
</tr>
<tr>
<td>UTA</td>
<td>Unbilled True-up Amounts</td>
</tr>
<tr>
<td>CARD</td>
<td>CRR Auction Revenue Distribution</td>
</tr>
</tbody>
</table>

**Current Risk**

Max

Max URTA + RTLCS + OUT
## Outstanding Unpaid Transactions (OUT)

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OIA</td>
<td>Includes outstanding invoices of all types</td>
</tr>
<tr>
<td>UDAA</td>
<td>Estimates(^1) for all Day-Ahead Markets that have not settled</td>
</tr>
</tbody>
</table>
| UFA       | • Average RTM Final Settlement  
            • 21-day lookback  
            • Projected over 55 days |
| UTA       | • Average RTM True-up Settlement  
            • 21-day lookback  
            • Projected over 180 days |
| CARD      | Estimate of Counter-Party’s share of CRR Auction Revenues already collected, but not paid out |

\(^1\) See Protocol Section 16.11.4.3.1 for details
Counter-Party EZrisk has been in the market for five months.

- Unbilled Real-Time Amount peaked at $1.7 Million twenty days ago
- Real-Time Liability Completed and Not Settled = $1.5 Million
- Outstanding Unpaid Transactions
  - Outstanding Invoice Amounts = $130,000
  - Unbilled Day-Ahead Amounts = ($29,000)
  - Unbilled Final Amounts = ($1000)
  - CRR Auction Revenue Distribution = ($200,000)

What is EZrisk’s current risk in the EAL calculation?
Example 5

Working Space
• Captures Incremental Load Exposure for Provider of Last Resort (POLR) in the event of a Mass Transition

• Based on

  • Number of ESI IDs transitioned
  • Pro-rata share of defaulting Counter-Party’s RTLE

This adjustment remains in place only until the Mass Transition is complete
Two categories of QSE Estimated Aggregate Liability

QSE Estimated Aggregate Liability ($EAL_q$)

Counter-Parties with Load and/or Gen QSEs

QSE Estimated Aggregate Liability ($EAL_t$)

Counter-Parties with no Load and/or Gen QSEs (Trade-Only)
• Calculated for all QSEs represented by Counter-Party

• Addresses multiple types of risk

Estimated Aggregate Liability for Trade-Only QSEs ($EAL_t$)
Future Risk for Trade-Only QSEs

- Operating Days yet to come
- Historical behaviors
- Historical and forward prices

QSE Estimated Aggregate Liability ($EAL_t$)

- Future Risk
- Current Risk

Initial Estimated Liability (New CPs) or
RFAF * Max Real-Time Liability Extrapolated or
Real-Time Liability Forward

Max

DFAF * Day-Ahead Liability Extrapolated
Max Real-Time Liability Extrapolated (Max RTLE)

- Based on **actual** Real-Time Settlements
  - Average Initial Settlement
  - 14 calendar day lookback
  - Projected over M1 days
- Maximum risk over the previous 40 days

\[
\text{Max Future Risk} = RFAF \times \text{Max RTLE} + \text{RTLF} + \text{DFAF} \times \text{DALE}
\]
Max Unbilled Real-Time Amount (Max URTA)

• Based on actual Real-Time Settlements
  • Average Initial Settlement
  • 14 calendar day lookback
  • Projected over M2 days

• Maximum risk over the previous 40 days
  20 days
Total Potential Exposure Any (TPEA) = Minimum Current Exposure + QSE Estimated Aggregate Liability + CRRAH Estimated Aggregate Liability + Potential Uplift
Estimated Aggregate Liability for CRR AHs (EAL$_a$)

- Calculated for all CRR Account Holders represented by Counter-Party
- Only one type of risk
### Outstanding Unpaid Transactions (OUT)

\[ \text{OUT}_a = \text{OIA}_a + \text{UDAA}_a \]

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OIA</td>
<td>Outstanding Invoice Amounts</td>
</tr>
<tr>
<td>UDAA</td>
<td>Unbilled Day-Ahead Amounts – Estimates(^1) for all Day-Ahead Markets that have not settled</td>
</tr>
</tbody>
</table>

\(^1\) See Protocol Section 16.11.4.3.1 for details
Total Potential Exposure Any

(TPEA) = Minimum Current Exposure

= QSE Estimated Aggregate Liability

+ CRRAH Estimated Aggregate Liability

+ Potential Uplift
Minimum Current Exposure

14 day lookback for Historic Data.
Generation discounted by 20%.

Max Wins!

Load vs. Generation vs. Trade Position

Minimum Load Exposure

Generation Outage Risk

Day-Ahead to Real-Time Risk

Initial Minimum Current Exposure

5 days of exposure for Load QSE
2 days, otherwise

1 day of exposure

2 days of exposure

1 day of exposure

$40,500 for Trade-Only QSE
$0, otherwise
Total Potential Exposure Any (TPEA) = Minimum Current Exposure + QSE Estimated Aggregate Liability + CRRAH Estimated Aggregate Liability + Potential Uplift
ERCOT may have to uplift short paid amounts owed by other Counter-Parties

Potential Uplift includes proportional amounts based on Counter-Party activities

• Amount to be uplifted within one year
• 25% of amount on a payment plan due to be repaid beyond one year
Putting TPEA back together

Total Potential Exposure Any (TPEA)

= Minimum Current Exposure

= QSE Estimated Aggregate Liability

= CRR AH Estimated Aggregate Liability

+ Potential Uplift

TPEA = \text{Max}[0, \text{MCE}, \text{Max}[0, ((1-\text{TOA})\text{EAL}_q + (\text{TOA})\text{EAL}_t + \text{EAL}_a)]] + \text{PUL}

\text{Trade-Only Activity flag}
Counter-Party EZrisk has been in the market for five months.

- QSE Estimated Aggregate Liability = $4.2 Million
- CRR AH Estimated Aggregate Liability = ($10,000)
- Minimum Current Exposure = $940,000
- ERCOT has no outstanding short paid amounts

What is EZrisk’s TPEA?
Example 6

Working Space
Module 4

Determining Available Credit Limits
Topics in this module ...

• Calculating Available Credit Limits
  • For CRR Auction
  • For Day-Ahead Market

• How credit is shared between CRR Account Holders and QSEs
Allocation of Credit

Counter Party

Maintains Financial Security with ERCOT

Available credit is shared

CRR Auction Credit Limit

CRR Account Holder

QSE

Day-Ahead Market Credit Limit
Available Credit

- Financial Security
- Unsecured Credit Limit
- Available Credit
- Total Potential Exposure
  - + 10% Markup

Financial Security beyond minimum provides available credit for daily ERCOT market activities
Available credit is shared by CRR Account Holders and QSEs.
Available Credit Limit for the CRR Auction (ACLC)

CRR Auction Credit Limit:
Min (ACLC or Requested limit)

Approved but not complete

Secured Collateral

Available Credit Limit (ACLC)

- TPEA + 10%
  - UCL
  - Guar.

- CRR Trade Exposure

- TPES + 10%
Available Credit Limit for the DAM (ACLD)

Remainder Collateral:

- Secured Collateral not consumed by CRR-related activities

- Secured Collateral, minus
  - TPES
  - CRR Trade Exposure
  - Available credit locked for CRR Auction
Available Credit Limit for the DAM (ACLD)

- Remainder Collateral
- Guarantees
- Unsecured Credit Limit

Available Credit Limit (ACLD)

10% of TPES

TPEA + 10%

DAM Credit Limit
Counter-Party EZrisk has one CRR Account Holder and one QSE. Their credit stats so far:

- Unsecured Credit Limit = $1 Million
- Total Potential Exposure Secured = $1400
- Total Potential Exposure Any = $4.19 Million
- Posted Secured Collateral = $5 Million
- No CRR Trades outstanding
- No Guarantees

EZ risk locks $900,000 for the CRR Auction that is about to start.

*What is EZrisk’s ACLD for the next Day-Ahead Market?*
Example 7

Working Space

Calculating Available Credit Limit for Day-Ahead Market

ACLD = (Remainder Collateral) + UCL – TPEA * 1.10 – TPES * 0.10

= (Secured Collateral – TPES – Locked) + UCL – TPEA * 1.10 – TPES * 0.10

= ($5M – $1400 – $900,000) + $1M – $4.19M * 1.10 – $1400 * 0.10

= $489,460
Module 5

Credit Processes
Topics in this module ...

- Initial Credit posting for new Counter-Parties
- Requests for additional collateral
- Daily Credit cycle
- Payment Breaches and remedies
Prior to market entry, Counter-Party must post sufficient Financial Security to meet 100% of TPE.
Counter-Party must also certify compliance with the following CFTC requirements:

- Expertise in Markets
- Market Operational Capabilities
- Allowable Participant
- Capitalization
- Risk Management Capabilities

Must recertify annually
90% TPE Notifications

Remainder Collateral

- 90%

Total Potential Exposure Any (TPEA)

Guarantees

Unsecured Credit Limit

ERCOT will use reasonable efforts to advise Counter-Party
ERCOT will use reasonable efforts to advise Counter-Party.
ERCOT shall notify Counter-Party of additional Financial Security due
ERCOT shall notify Counter-Party of additional Secured Collateral due
Counter-Party requirements after Collateral Request

- Provide suitable Financial Security
- Post at least the required amount
- ERCOT must receive by COB on the second Bank Business Day after notification
The Daily Grind
Daily Credit Cycle Timeline

Prior to 0800

0800
1030
1200
1500
1630
1730
1800
2000

Counter Parties
Credit Staff
CMM¹

Overnight Calculation
1. TPE & ACL calcs
2. Generate Reports
3. Identify Collateral Need
4. 90% TPE Notifications

¹ Credit Monitoring and Management
Daily Credit Cycle Timeline

0800
- Counter Parties
  1. Receive Preliminary Reports
  2. Receive Collateral Requests
  3. Receive 90% TPE notification

1200
- Credit Staff
  1. Review Preliminary TPE & ACL Calcs
  2. Post Preliminary Reports
  3. Send Collateral Requests as needed
  4. Send 90% TPE Notifications

1200
- CMM
  1. Receive Preliminary TPE & ACL Calcs
  2. Post Preliminary Reports
  3. Send Collateral Requests as needed
  4. Send 90% TPE Notifications
Daily Credit Cycle Timeline

Counter Parties
1. Receive Preliminary Reports
2. Receive Collateral Requests
3. Receive 90% TPE notification

Credit Staff
1. Review Preliminary TPE & ACL Calcs
2. Post Preliminary Reports
3. Send Collateral Requests as needed
4. Send 90% TPE Notifications

CMM
1. Receive and Review CRR Trades
2. Receive Invoices, Statements & Payments
Daily Credit Cycle Timeline

1. Review and Approve CRR Trades
2. Post Collateral Payments
3. Perform Exposure Adjustments as needed

1. Receive DAM Estimates
Daily Credit Cycle Timeline

Counter Parties
1. Review Final TPE & ACL Calcs
2. Send CRR Trade Response

Credit Staff
1. TPE & ACL Calcs
2. Generate Reports

CMM
Intra-Day Calculation
1. TPE & ACL Calcs
2. Generate Reports
Daily Credit Cycle Timeline

1. Lock Auction Credit Limit in CRR System
2. Receive “Locked” credit from CRR

Credit Staff
1. Send ACLC to CRR
2. Receive “Locked” credit from CRR

CMM
1. Send ACLC to CRR

Counter Parties
1. Lock Auction Credit Limit in CRR System
2. Receive “Locked” credit from CRR

1630-1730
Daily Credit Cycle Timeline

- **Counter Parties**
  1. Send ACLD to DAM
  2. Receive Confirmation from DAM

- **Credit Staff**
  1. Send ACLD to DAM
  2. Receive Confirmation from DAM

- **CMM**
  1. Send ACLD to DAM
  2. Receive Confirmation from DAM
Daily Credit Cycle Timeline

Counter Parties
1. Receive Final Reports

Credit Staff
1. Review and post Final Reports

CMM
1. Receive Invoices, Statements & Payments
2. Receive RTM Estimates
3. Receive CRR Inventory

0800 1030 1200 1500 1630 1730 1800 2000
Payment Breaches and Remedies
Failure to pay an obligation when due is a Payment Breach

- Settlement Invoice
- Collateral Request
- Other ERCOT Invoices

ERCOT shall immediately attempt to contact the Market Participant telephonically and by email.
Becomes a Late Payment if cured within one Business Day of Notification

- Settlement Invoice
- Collateral Request
- Other ERCOT Invoices

ERCOT shall track the number of Late Payments in each rolling 12-month Period
Becomes a Default if **not** cured within one Business Day of Notification

- Settlement Invoice
- Collateral Request
- Other ERCOT Invoices
ERCOT may take several actions to remedy Defaults

- Hold any payments due
- Draw on Financial Security
- Forfeit awarded CRRs
- Repossess CRRs
- Revoke Market Participant’s rights
- Terminate Market Participant’s Standard Form Agreement
## Remedies for Late Payments

<table>
<thead>
<tr>
<th>Circumstance</th>
<th>Options</th>
<th>Enforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Late Payment*</td>
<td>• No action</td>
<td><strong>Level I</strong></td>
</tr>
<tr>
<td></td>
<td>• Level I Enforcement</td>
<td>Financial Security</td>
</tr>
<tr>
<td></td>
<td></td>
<td>at or above 110% * (TPE – UCL)</td>
</tr>
<tr>
<td>Second Late Payment*</td>
<td>• Level I Enforcement, if not there already</td>
<td><strong>Level II</strong></td>
</tr>
<tr>
<td></td>
<td>• Level II Enforcement</td>
<td>Cash or Letter of Credit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>at or above 110% * (TPE – UCL)</td>
</tr>
<tr>
<td>Third Late Payment*</td>
<td>• Level II Enforcement, if not there already</td>
<td><strong>Level III</strong></td>
</tr>
<tr>
<td></td>
<td>• Level III Enforcement</td>
<td>Last chance warning</td>
</tr>
<tr>
<td>Fourth Late Payment*</td>
<td>• Level III Enforcement</td>
<td>Termination</td>
</tr>
</tbody>
</table>

* In any rolling 12-month period
Module 6

MIS Credit Reports
Topics in this module ...

- Keeping track of it all
- Available Credit Reports on MIS
- Details of Credit Reports
Keeping Track of it All

MIS Credit Reports

Available Credit Limit Summary

Minimum Current Exposure

DAM Credit Reports

Total Potential Exposure

Future Credit Exposure

Estimated Aggregate Liability
ACL Summary Reports

- ACLC
- ACLD
- Calculation Components
- Prepay Summary

Posting frequency
- Twice per Business Day
- Once per non-Business Day
Flexible Accounts

- NPRR 702 provides rules
- Implementation date TBD

For current Prepay account practices, please contact your ERCOT Account Manager or the ERCOT Credit Manager
MCE Summary Reports

- Load Exposure
- Generation Outage Risk
- Day-Ahead to Real-Time Risk

Posting frequency
- Once per Day
- Twice per Business Day if changes
DAM Credit Reports

Available Credit Limit Summary

Minimum Current Exposure

DAM Credit Reports

DAM Aggregate Credit Exposure

Posted after each DAM

DAM Remaining Available Credit Limit

Posted every 15min before DAM

Total Potential Exposure

Future Credit

Estimated Credit
Keeping Track of it All

MIS Credit Reports

Available Credit Limit Summary
Minimum Current Exposure
DAM Credit Reports

Total Potential Exposure
Future Credit Exposure
Estimated Aggregate Liability
TPE Summary Reports

- TPES
- TPEA
- Calculation Components

Posting frequency
- Twice per Business Day
- Once per non-Business Day
Future Credit Exposure Summary Reports

- **FCEOPT Report**
  - Volumes
  - Exposure

- **FCEOBBL Report**
  - Volumes
  - Exposure
  - Other parts

*Posted once per day*
Estimated Aggregate Liability Reports

- **Summary**
- **QSE major parts**
- **CRRAH major parts**
- **Detail Report**

**Posting frequency**
- Once per Day
- Twice per Business Day if changes
# Finding Credit Reports on MIS

## Credit Monitoring Reports

<table>
<thead>
<tr>
<th>Title</th>
<th>Load Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available Credit Limit (ACL) Summary Report</td>
<td>Annual Load Shed Test Reports for Load Resources</td>
</tr>
<tr>
<td>DAM Aggregate Credit Exposure</td>
<td>Group 1 and Group 2 Load Resources for RRS</td>
</tr>
<tr>
<td>DAM Remaining Available Credit Limit by Counter Party</td>
<td>Load Resource AS Qualification Test Reports</td>
</tr>
<tr>
<td>Estimated Aggregate Liability (EAL) Detail Report</td>
<td>Load Resource SCED Qualification Test Results</td>
</tr>
<tr>
<td>Estimated Aggregate Liability (EAL) Summary Report</td>
<td>QSE AS Qualification Test Reports</td>
</tr>
<tr>
<td>Future Credit Exposure for CRR PTP Obligations Portfolio Summary Report</td>
<td>Responsive Reserve Performance Report for Resource Specific Non CLRs</td>
</tr>
<tr>
<td>Minimum Current Exposure (MCE) Summary Report</td>
<td></td>
</tr>
<tr>
<td>Total Potential Exposure (TPE) Summary Report</td>
<td></td>
</tr>
</tbody>
</table>

## ERS Certified Data

<table>
<thead>
<tr>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERS Award Notification</td>
</tr>
<tr>
<td>ERS Meter Data Error Report</td>
</tr>
<tr>
<td>ERS Preliminary Baseline Review Results</td>
</tr>
<tr>
<td>ERS Pre-populated Resource Identification Forms</td>
</tr>
<tr>
<td>ERS QSE-level Payment Details Report</td>
</tr>
<tr>
<td>ERS QSE Portfolio Availability Summary</td>
</tr>
</tbody>
</table>
Conclusion:
A Few Thought-Provoking Exercises
A Counter-Party named Loads-R-us is registered as a QSE. They have Load but no Generation.

*What are some ways they can reduce their credit exposure in the ERCOT Market?*
A Counter-Party named Gen-R-oCity is registered as a QSE. They have Generation but no Load.

*Will they ever have any credit exposure?*
A Counter-Party named Derivatives-R-us is registered as a CRR Account Holder.

*What are some ways they can reduce their credit exposure in the ERCOT Market?*
You should now be able to …

• Describe the impacts of common business activities on credit exposure

• Define the types of Financial Security utilized at ERCOT

• Illustrate how ERCOT calculates Available Credit Limits

• Summarize the credit management processes in ERCOT’s markets

• Locate and utilize various credit reports from the Market Information System.
ERCOT values your feedback on your experience in completing this instructor-led course.

Survey Handout

www.surveymonkey.com/r/ERCOTMarketTraining

Survey Launch QR Code:
Accessing additional information

ERCOT Protocols
http://www.ercot.com/mktrules/nprotocols/

ERCOT Training
http://www.ercot.com/services/training/

ERCOT Account Management Services
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ERCOT Credit
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ERCOT Market Education Contact
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