OLIVER WYMAN

ERCOT
THE TEXAS CONNECTION

Corporate Risk

October 1, 2010

Credit risk management review and benchmarking study
DRAFT

Austin, TX

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Oliver Wyman Executive Summary

- ERCOT's general credit practices, credit worthiness standards and credit exposure calculations meet or exceed industry standards and should fully support the transition to Nodal
- Collateral requirements are reasonably conservative, representing a prudent balance of conservatism and market accessibility given the move to a new market structure
  - Primary concerns for market participants reflect pricing uncertainties and the corresponding collateral requirements generated from market trial results in Real Time (RT) and Day Ahead Market (DAM). However, those collateral requirements were driven by the market trial pricing results rather than by ERCOT credit procedures
  - Discretionary parameters do give ERCOT the ability to adjust collateral requirements post "go-live," providing flexibility to reflect potential changes in the market's appetite for risk
- From a governance perspective, the existing reporting relationship for credit meets best practice standards as it is fully independent of operational activities
- Given ERCOT's experience in recent years with unique risk events, the credit risk management practices have proven to be flexible in responding to these events and conservative collateral requirements provide additional protection
- Recommendations for post nodal implementation are provided on slide 11. Some highlights include:
  - ERCOT would benefit from developing an explicit risk appetite statement and tolerance for aggregate credit risk, which would improve ERCOT's overall governance and reduce potential confusion and disagreement concerning required collateralization levels
  - We strongly suggest that the organization resume using the credit loss model as soon as possible

Section 1

Credit risk management review results

Credit Risk Management Project Overview

Oliver Wyman was engaged to perform a brief review of ERCOT's credit risk management practices in preparation for the December 1, 2010 Nodal implementation

Project objectives

- The credit practices review included ERCOT's Nodal Protocols and Creditworthiness Standards, as well as ERCOT's general credit risk management practices
- In assessing ERCOT's capabilities in these areas, particular focus was placed on the following aspects of performance
  - Gap to best practice standards
  - Resource levels and qualifications
  - Consistency of counterparty treatment considering the type of counterparty, as well as, size and corporate status
  - Mitigation of unknown risks – based on an outside-in view of the overall ERCOT credit risk management approach

Deliverables

- Assessment of Nodal credit practices with recommendations for enhancement
- Assessment of Creditworthiness standards as implemented for Nodal, and the related establishment of unsecured credit limits with recommendations for enhancement
- Assessment of credit exposure measurement techniques with recommendations for enhancement
- Recommendation on ways to mitigate credit exposure taking into consideration implementation concerns such as cost and implementation difficulty

Constraints

- Limited timeframe (~4 weeks) to meet management timeline
- Market data and credit results are largely illustrative

Oliver Wyman based the review on client experience, document reviews, select interviews (ERCOT representatives, market representatives, board members, other NA ISOs, and the PUC), analysis and review of publicly available market information

Our understanding of ERCOT's transition to Nodal

While some level of uncertainty exists around market dynamics (pricing and volumes) for Nodal implementation, it is clear that ERCOT's credit management may experience:

- Significant increase in counterparty activity in terms of volumes and thus credit exposures
  - Potentially significant increase in collateral requirements by ERCOT
  - Reduced individual net potential losses as a result of increased collateral requirements over zonal requirements
- Uncertainty around "go-live" RT and DAM pricing characteristics given unusual market participation in Nodal market trials
- Uncertainty around exposure concentration and collateral requirements on non-business days
- The need for greater transparency regarding global and entity specific discretionary exposure adjustments
- Additional staffing requirements to support data processing and reporting requirements
  - Aggressive timelines for reviewing exposure and producing daily available credit limits for the CRR auction and the DAM
  - Increased staffing and processing effort to support intra-day and non-business day reporting

Credit Evaluation Framework

The framework for the evaluation included three functional elements that addressed key aspects of a comprehensive credit risk management program

General credit practices	Creditworthiness	Credit exposure
▪ Organization, staffing and governance ▪ Risk appetite and tolerance ▪ Technology ▪ Policies and procedures	▪ Credit scoring ▪ Limit setting ▪ Collateral management ▪ Credit monitoring ▪ Workout	▪ Exposure measurement and monitoring – Real Time (RT) – Day Ahead Market (DAM) – Congestion Revenue Rights (CRR) ▪ Loss reserves and capital

- **This evaluation framework links directly to the framework Oliver Wyman used in 2007 to perform a comprehensive evaluation of ERCOT's credit practices and credit standards**
- **The current review focused on changes as a result of the Nodal implementation**

Credit risk management review – General Credit Practices

ERCOT's general credit practices were found to be consistent with our evaluation framework standards and are ready for Nodal transition

Element	Standards	Assessment
Organization, staffing and governance	▪ Credit management activities report through Finance/Treasury and are independent of front office activities ▪ Policies, procedures and limits are approved by the risk committee ▪ Credit analysts' skills and number are appropriate for the credit function's day-to-day requirements	▪ Finance/Treasury credit risk reporting structure is consistent with best practice and mitigates potential conflict of interest ▪ Credit staffing capacity is within range of peer company review, however, the activity requirements are on the high range of peers ▪ Current credit staff has sufficient experience and training to handle the anticipated requirements of the Nodal market ▪ Credit function lacks true risk management experience and deep financial engineering skills, but there is an infrequent need for these skills and these skills are not found in peer organizations ▪ General reporting framework (number of reports, timeliness, content) has improved and is appropriate for Nodal reporting requirements
Risk Appetite	▪ Clear and documented risk appetite definition and framework should be in place to guide credit risk principles	▪ Implied risk appetite is low, and defined by market participants through protocol development. Consensus is not perfect, but substantial agreement exists on key credit issues
Technology	▪ Technology platform is used to automate daily reports and minimize need for manual data entry requirements ▪ Periodic validation of automated reports to ensure accuracy	▪ Credit management system has streamlined daily operation requirements, augmented reporting/analysis capabilities and provides flexibility for further automation ▪ Potential credit loss model will require some modification to properly reflect Nodal conditions
Policies and procedures	▪ Formalized risk policy framework and hierarchy, including name and number of existing risk policies ▪ Clearly assigned roles and responsibilities for: primary policy writer, key stakeholders to be involved, process and timing ▪ Validation that procedures align with policies	▪ Procedure and protocol development resources are adequate for nodal requirements ▪ Current polices and procedures (including protocols) are highly structured, complete, detailed and appropriate for nodal requirements

Credit risk management review – Creditworthiness practices

ERCOT's credit worthiness practices were found to be consistent with our evaluation framework standards and are ready for Nodal transition

Element	Standards	Assessment
Credit scoring	▪ Counterparties are scored for granting unsecured credit and included in potential loss calculations ▪ Credit scoring technique is well-defined and is based on the counterparty credit rating, as well as, additional quantitative and qualitative data ▪ Credit analysis and assessment are used to adjust the rating up or down based on a comparison to the peers	▪ Nodal credit scoring requirements introduce minimal changes from zonal requirements and corresponding positive assessment in previous Oliver Wyman review (2007) ▪ ERCOT's credit scoring model used in its PFE model provides a solid alternative to agency ratings where they are unavailable, and encompasses the impact of guarantees ▪ Unsecured credit limits continue to be conservative relative to peers and ERCOT has historically granted less than the full limit – Fewer than 20 participants or approximately 10% of counterparties have access to unsecured credit and total unsecured credit is ~$225MM[1] – Approximately 30 counterparties have access to credit secured by guarantee agreements and total credit secured by guarantees is ~$550[1]. It is important to note that this form of collateralization has been removed by some of ERCOT's peers
Limit setting	▪ Formal procedure for granting unsecured credit is part of the credit risk policy ▪ A consistent and equitable rationale supports the limits, with respect to underlying economic capital considerations, defined risk appetite, etc	

[1]September 11, 2010 Support Materials for Finance & Audit Committee Meeting

Credit risk management review – Creditworthiness practices (continued)

ERCOT's credit worthiness practices were found to be consistent with our evaluation framework standards and are ready for Nodal transition

Element	Standards	Assessment
Collateral management	▪ Standard forms are required for all guarantees, LCs, surety bonds ▪ Clear policy in place on the use of third party guarantees, LCs, etc. ▪ Customers can enter into pay-down (prepayment) agreements, in order to reduce collateral requirement ▪ Any recovery rates (haircuts) applied to guarantees or letters of credit are supported by policy documentation	▪ Collateral requirements are stringent and similar to other ISOs, utilizing rigorous standard forms for all key agreements ▪ Daily, intra-day and non-business day monitoring and reporting of credit limits minimizes risk ▪ Daily monitoring of credit rating notifications/changes and significant events allows for ad-hoc credit adjustments ▪ Current receivables, potential exposure and available collateral are all monitored and reported daily ▪ Range of workout remedies allows appropriate response in a variety of situations and is a best practice
Credit monitoring	▪ Maximum net exposure by counterparty is updated and reported daily ▪ Constant monitoring of internet and other press sources ▪ Quarterly financial data are updated as received	
Workout	▪ Risk committee has discretion throughout the workout process, enabling flexibility to work with the counterparty and avoid a default ▪ Declaration of bad debt loss is based on the reasonable expectation of CFO that the counterparty will not pay in an acceptable time period ▪ Alternative payment plans, extended netting and other workout approaches are clearly defined and approved by the risk committee	

Credit risk management review – Credit exposure practices

ERCOT's credit exposure practices were found to be consistent with our evaluation framework standards and are ready for Nodal transition

Element	Standards	Assessment
Exposure measurement and monitoring	▪ Exposure for collateral requirements accounts for forward price movement ▪ Netting agreements are fully reflected in exposure measurements ▪ Formal monitoring processes and stress testing of exposures are in place ▪ Credit information is provided regularly to risk committee and Board	**Core Credit Exposure** ▪ Core credit exposure calculations themselves are performing as per protocols, however, given extremes in market trial data, it is difficult to evaluate the reasonableness of the calculated exposures ▪ Counterparty risk measurement appropriately includes both historical receivables and future potential exposures and are timely ▪ Daily review activities have been established and are followed to proactively identify calculation abnormalities and test reasonableness of exposure calculations ▪ Potential credit loss calculations are not currently performed, but are scheduled to resume when sufficient valid market data is available
Loss reserves and capital	▪ Risk appetite statement drives the target solvency level ▪ Credit loss or economic capital modeling provide a consistent framework for loss reserve determination ▪ Access to lines of credit or revolvers, in lieu of formal loss reserve, in order to maintain liquidity	**DAM Credit Exposure** ▪ Potential exposures are based on consistent thresholds (e.g., 95th%[1]) of recent historical market conditions, and bid screening is performed ▪ This approach is conservative, as collateralization at this level could be insufficient fewer than 18 days per year. This represents a prudent balance of conservatism and market accessibility ▪ Some netting of bid and offers from a given counterparty is provided, which mitigates collateral requirements, while monitoring for RT impacts. **Aggregate Assessment** ▪ A number of discretionary controls are available to ERCOT credit management to adjust for unusual circumstances

[1]Collateral based on a 95th percentile price will be sufficient to cover collateral requirements 347 days out of 365 days total.

Summary recommendations

The following suggestions are designed to improve the credit risk management program post Nodal implementation

Review elements	Summary recommendations
General credit practices	▪ Develop formalized risk appetite statement/ methodology to inform aggregate credit exposure, collateral requirements, and unsecured credit practices ▪ Design and implement a formal credit process improvement program ▪ Consider credit risk analytics and market risk management training options to enhance existing credit team skill-set ▪ Consider additional automation paths to improve efficiency and accuracy (i.e., manual workarounds, financial statement updates, etc.)
Credit worthiness	▪ Test and refine internal credit scoring model developed for the PFE model to inform overall credit limits ▪ Introduce additional real-time indicators such as CDS spreads in counterparty reviews ▪ Re-evaluate workout protocol to ensure adequate alternatives are available for collateralizing counterparties
Credit exposure	▪ Resume using the credit loss model as soon as possible ▪ Consider potential adjustments to collateral requirements based on market segmentation (generation, load, trading) characteristics. Further netting capability should be considered after the Nodal market is operational and stable ▪ Increase use of credit loss model to stress test market scenarios ▪ ERCOT should continue to evaluate alternate credit risk management options including, but not limited to, extended netting, contingency pools, clearing house approach, etc. ▪ Periodically (i.e., 6 months) review FCE to determine appropriateness of collateral requirements

Section 2

Benchmarking results

Our approach to peer benchmarking

Through a series of brief individual calls with US-based ISOs and other exchanges, as well as desk research, we attempted to capture the following benchmark data

- Limits on unsecured credit as a percent of tangible net worth
- Staffing headcount
- Staffing experience and pre-requisites
- Use of technology
- Range of discretion for credit limits and collateral requirements
- Collateral requirements for market offers
- Use of hard limits and screening practices
- Reporting frequency and non-business day reporting requirements

Comparison of ERCOT's practices with other peer institutions

ERCOT compares favorably on a majority of the review elements indicating a conservative approach to credit risk management relative to peer institutions

Benchmark Continuum
(Level of conservatism)

Low — High

Review Elements	Comments
Limits on unsecured credit	▪ ERCOT's unsecured credit limit guidelines are conservative relative to peers (see following slide)
Staffing headcount	▪ Based on Market Reform research and peer discussions, staffing headcount ranges from 2 FTEs to the 6.5 FTEs at ERCOT. ERCOT intra-day and non-business day reporting requirements support their high level of staffing requirements. In this case, more headcount is considered conservative given the uncertainty in nodal requirements for credit.
Staffing experience	▪ The benchmarking discussions suggested standard corporate credit experience as the normal requirements for credit function requirements. There were a few examples of industry management consulting experience, but no evidence of advanced mathematics, formal risk management or financial engineering
Technology	▪ Technology applications ranged from excel based and ad-hoc reporting to complex credit management systems either built in-house or customized retail products. ERCOT's customized ROME system appeared more advanced than most of its peers
Credit limit discretion	▪ Credit limit discretion ranged from rules based limits with limited discretion based on tariffs to full discretion with appropriate transparency to the market
Offer collateral requirements	▪ Offer collateral requirements ranged from full netting (lower risk management) to partial netting with 1st priority security interest
Hard limits & screening requirements	▪ Hard limits and screening processes ranged from soft and multi-day reviews to intra-day and hard screening for DAM and Virtual Bids
Reporting frequency & non-business day reporting requirements	▪ Reporting frequency ranged from multi-day reporting (every third day) to intra-day reporting and non-business day reporting requirements

◆ ERCOT

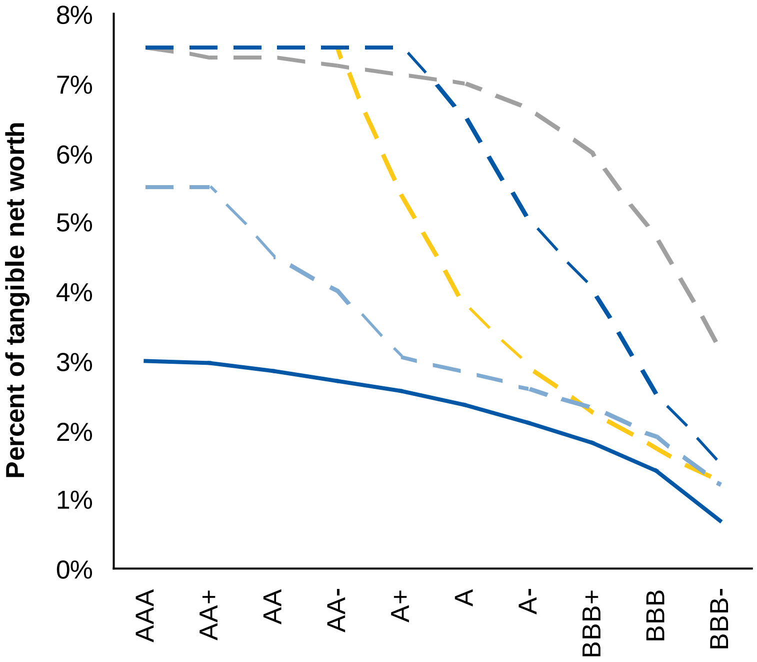
Comparison of ISO practices in granting unsecured credit

Even with recent changes by PJM and CAL ISO, ERCOT still continues to be in the conservative of granting unsecured credit

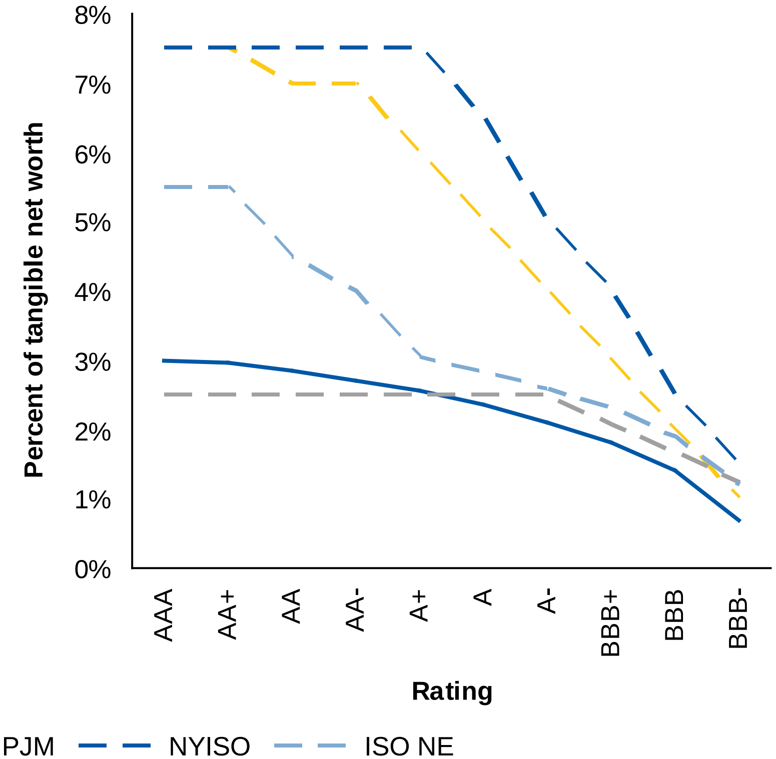
Unsecured credit limits

Maximum unsecured line as a % tangible net worth

October 2008



October 2010



Source: Transmission operators' credit policies

Notes: Midwest ISO is excluded from this analysis as they do not use standard credit ratings to support unsecured credit decisions. In addition, several of these ISOs apply a CAP to the level of unsecured credit provided to each counterparty

Contextual comparison with financial services institutions and markets

Best, and emerging, practices in the banking community may provide insight regarding the evolution and direction of corporate counterparty credit risk management

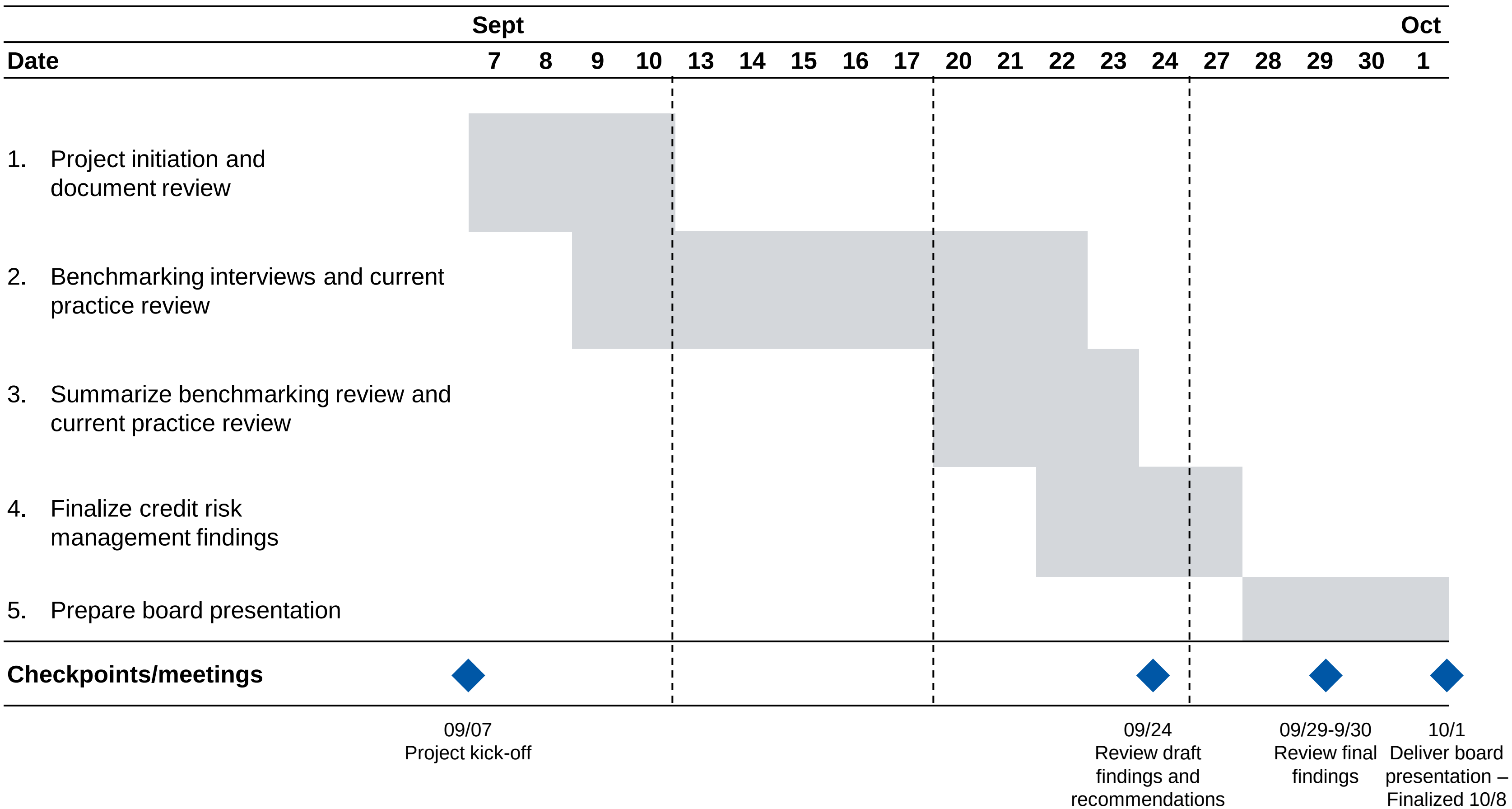
Issue	Observations
General credit practices	▪ Risk appetite definitions or statements are universal in the financial services sector, and form the foundation for the PFE definitions (percentile choices, etc). These are typically informed by a range of activities including beta-estimation / targeting and the analysis of scenarios designed to reflect key financial constraint testing
Credit worthiness	▪ Unsecured counterparty credit has become extremely rare in OTC transactions among participants in the FS sector. These OTC transactions all require cash or government securities to collateralize the full PFE. The advantage of transacting OTC (rather than on exchange) is the potential for workout rather than the complex and demanding exercises of many of the exchanges protocols • In circumstances where additional transaction information is available, such as prime brokerage (equivalent to ERCOTs knowledge of MP scheduled volumes), best practice is for credit analysts to continuously monitor the implied financial health of major counterparties. However, this level of analysis requires approximately 1 credit analyst per 10 to 15 counterparties and may not be cost effective for ERCOT’s current operating environment
Credit exposure	▪ The universal minimum standard for credit exposure assessment is a probability based metric such as potential future exposure (PFE) ▪ Multi-lateral netting and settlement services are increasingly being provided by third parties to decrease risk/capital requirements. E.g., CLS Bank was formed in 2002 exclusively to settle and net FX transactions. CLS now operates 6 days a week, 24 hours per day, settling $4T daily with average cash capital requirements of about 5% of transaction value ▪ More advanced FS counterparties spend significant effort separating and modeling “wrong-way” risk impacts (these arise when a single market risk factor increases credit risk exposure, and simultaneously decreases counterparty financial strength). This is the case at ERCOT for power prices and load serving entities. Proper modeling involves linking PFE to shifts in counterparty PD

Appendix

Project approach and interview participants

Project Timeline

The project was executed over the course of four weeks with a number of checkpoints in advance of finalizing the report and preparing the board presentation



Current Practice and Benchmarking Interviews

Oliver Wyman conducted over 20 interviews with company representatives, regulatory representatives, market participants and ERCOT peers to provide additional perspective for its review and support it's conclusions

Interviews

Name – Stakeholder Group

- Anderson, Kenneth W. Jr. – Public Utility Commission of Texas, Commissioner
- Bermudez, Jorge – ERCOT Board, F&A Committee
- Blackburn, Don – Luminant
- Cleary, Mike – ERCOT COO
- Coffing, Tim – Luminant
- Davies, Morgan – Calpine, Market Credit Working Group
- Doggett, Trip – ERCOT CEO
- Espinosa, Miguel – ERCOT Board , F&A Committee Vice Chair
- Goff, Eric – Reliant/NRG, Credit Working Group
- Jones, Brad – Luminant
- Karnei, Clifton – ERCOT Board, F&A Chair
- King, Kevin – California ISO
- Lafreti, Jeff – New England ISO
- Loomis, Hal – PJM ISO
- Nikazm, Tamila – Austin Energy, City of Austin, Credit Working Group
- Pabbisetty, Suresh – ERCOT Senior Treasury/Credit Analyst
- Petterson, Mike– ERCOT Controller
- Prall, Kyle– ERCOT Credit Analyst
- Prevatil, Sherri – New York ISO
- Spangler, Arleen – NRG, Market Credit Working Group
- Spells, Vanessa – ERCOT Credit Manager
- Yager, Cheryl – ERCOT Treasurer
- Zapanta, Rizaldi – ERCOT Credit Analyst