



Denton Municipal Electric ("DME")
Recommendations for DME's Energy and Risk Management Program
December 2017

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STATEMENT OF WORK

This Statement of Work between Deloitte & Touche LLP (“Consultant” or “we” or “our”) and City of Denton (the “Owner” or “you”) was to provide an analysis and recommendations in support of establishing Denton Municipal Electric’s (“DME”) the FY 2017 Energy Management Organization (“EMO”) cost savings benchmark (the “Services”).

SCOPE, APPROACH, AND ASSUMPTIONS

The nature of the Services that the Consultant is to perform for the Owner can be broken into the following tasks:

- Task 1: FY 2017 benchmark cost analysis
- Task 2: EMO capability maturity assessment

The scope of work will focus on helping the Owner and DME establish a benchmark for FY 2017 that is representative of the capabilities of the EMO. The approach to providing these services includes:

Task 1: FY 17 Benchmark Cost Analysis

Key Activities:

- Assess the appropriateness of different methodologies for calculating the FY2017 cost savings, including the following:
 - A benchmark method initially identified by DME for FY 2017: 3.5 heat rate adder over the DAM ERCOT index for energy
 - A benchmark method based on the following approach – Compare actual performance to the market forwards as of a particular date for the energy component
- Identify the advantages and disadvantages between benchmark different options
- Recommend an option going forward for the City of Denton and DME’s consideration

Task 2: EMO Capability Maturity Assessment

Key Activities

- Gain an understanding of DME’s current energy risk management governance structure, control activities, resources and technology, including the possible risks assumed by DME with the creation of the EMO
- Interview specific Owner and DME personnel involved in the execution of the EMO program in order to develop an in-depth understanding of EMO’s existing activities.
- Identify potential gaps and develop recommendations utilizing our proprietary Capability Maturity Model
- Review our findings and recommendations with appropriate Owner and DME personnel

- Advise DME management in their preparation for specific stakeholder discussions (e.g. Board of Directors, senior management, City Council) to gain agreement and consensus on their desired future state program

Task 1: Deliverable

Analysis of FY 17 Benchmark Alternatives

D&T independently compared selected options based on input from DME. The options are:

- **Option 1:** *ERCOT Index Plus* is a +3.5 heat rate adder over the day-ahead market ERCOT index
- **Option 2:** Compare actual performance to the forward price for electricity as of 09/30/2017

The results of our analysis and the respective cost savings are displayed in the exhibit below.

Exhibit 1: Comparison of FY17 benchmarks alternatives

Method	Source	Category	Costs
Benchmark Costs	D&T Calculation	Option 1 day-ahead + 3.5	\$ 36,868,926
	D&T Calculation	Option 1 without heat rate adder	\$ 28,952,360
	D&T Calculation	Option 2 9-30-2016 Forward Curve	\$ 30,618,559
EMO Costs	Provided by EMO	EMO Costs	\$ 26,537,952
Savings	D&T Calculation	Option 1 day-ahead + 3.5	\$ 10,330,974
	D&T Calculation	Option 1 without heat rate adder	\$ 2,414,407
	D&T Calculation	Option 2 9-30-2016 Forward Curve	\$ 4,080,606

D&T has preliminary concluded that there are FY17 cost savings with either approach, but there are significant differences when comparing the two options. The disadvantage of Option 1 is that the benchmark is consistently moving with the Day Ahead market, which allows the cost savings to always contain a premium. When eliminating the 3.5

heat rate premium on Option C, the cost savings is reduced by ~\$8 MM. Using the 9-30-2016 forward curve for ERCOT North ATC (\$/MWh) creates a clearly defined benchmark allowing for a consistent comparison of actual results; however, it does not consider DME's objectives and how the utility's energy and risk management activities support those objectives.

An Alternative to Cost Savings

If you assume that the objective is to assess the performance and value of the EMO, it should be focused on desired outcomes and how well the EMO achieves the outcomes. The outcomes should be mapped to objectives or a quantitative statement of what the EMO is trying to achieve. For example, what would be considered good outcomes for the EMO, DME and its customers? It should consider:

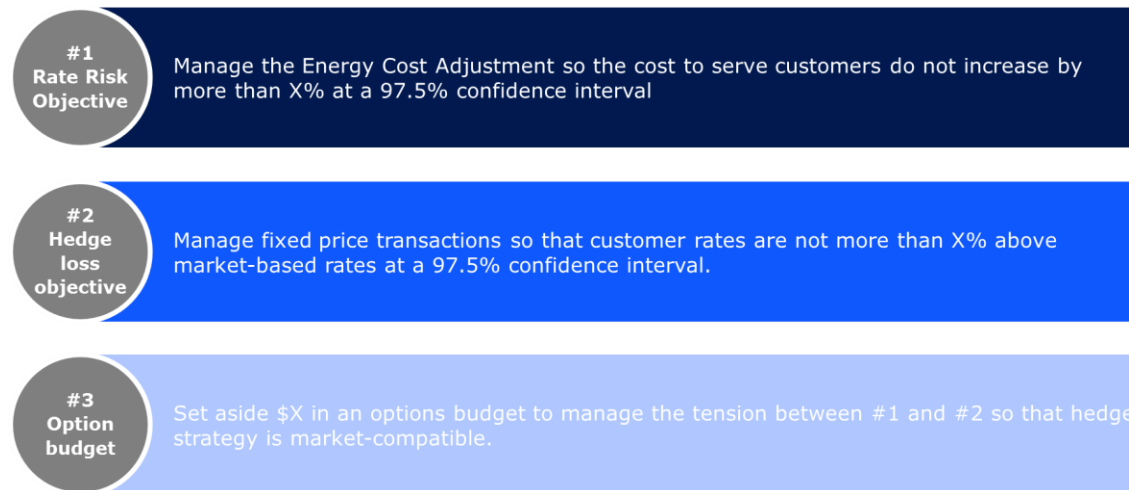
- Stable electricity rates when prices rise
- Competitive and lower rates when prices fall

How do you accomplish this?

- By having a set of paired and market-compatible objectives
- By having a hedge strategy and risk limits that have been demonstrated to achieve those objectives
- By having the risk infrastructure (data capture, risk quantification, and monitoring) in place to know when to act

The following is an example of a set of paired and clearly defined objectives:

Exhibit 2: Illustrative objective statements

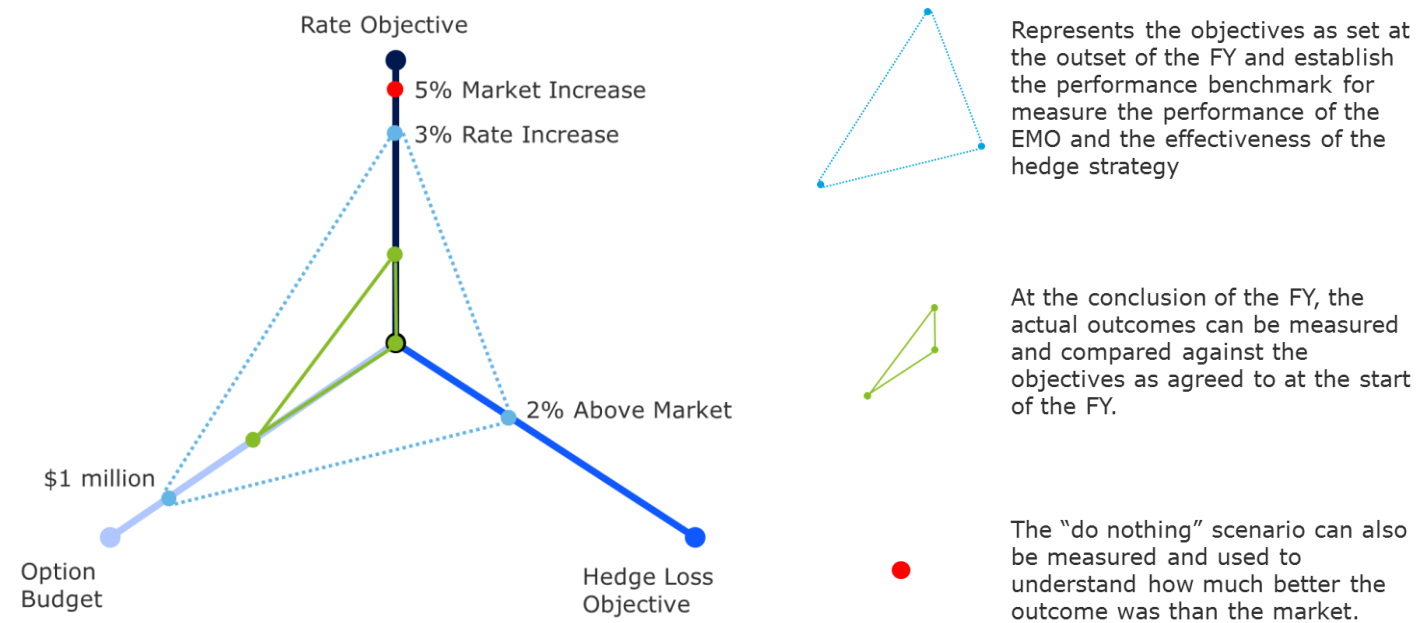


To fill the framework with specifics surrounding the risk limits, it's important to understand the magnitude of hedgeable risk inherent in the business. This is done by developing a risk profile using financial engineering methods. This approach generates a range of prices applicable to the hedgeable portion of the utility's risk exposure. This allows for a determination of a probabilistic range of exposure for costs, rates, or any other financial objective.

By quantifying exposure, improved transparency allows for a structured approach to assessing organizational risk tolerances and the management of uncertainty due to commodity prices and volume. With a clear picture of the range of possible outcomes, you may then have informed conversations with key decision makers about how much price and volume risk the organization would like to mitigate from its operations and thus the objectives and the risk limits to manage the exposure.

The end result of this process is a structured approach to developing appropriate objectives and ensuring that they are clear, quantified, and actionable while also developing a pre-approved approach where trade-offs are discussed and made. When this is done, it is simple to measure actual performance against market results to understand how effective the energy and risk management activities were in mitigating unfavorable outcomes. The exhibit below provides an illustrative example of how performance can be compared to risk limits and market outcomes to assess the value added by the energy and risk management function.

Exhibit 3: Translating objectives into risk limits and a performance measurement framework:



The ideal goal would be to manage the tension between different objectives in **Exhibit 2** above. By designing a risk acceptable, budget conscious, active & balanced hedge strategy that has been thoroughly simulated, one can create measurable and quantifiable objectives and risk limits as shown in **Exhibit 3**. The exhibit above provides difference conclusions based on different scenarios, which can help evaluate the performance and effectiveness of the hedge strategy.

D&T’s Recommendation

Based on this approach, D&T recommends the following:

1. Focus less on cost-savings and more on a value based approach with a set of paired and market-compatible objectives
2. Quantify the utility’s risk profile
3. Design a hedge strategy and risk limits aligned to the objectives
4. Simulate a comprehensive set of hedge alternatives and test actual outcomes against the objectives.
5. Select the appropriate hedge strategy for the utility. Re-evaluate the strategy on a periodic basis depending on changing organizational objectives and market conditions

Task 2: Deliverable

Scope

Deloitte & Touche LLP ("D&T") was engaged by City of Denton ("Denton" or "Company") to complete an assessment of the Denton Municipal Electric's ("DME") Energy Management Organization ("EMO") program. This includes an assessment of the current state of the energy and risk management program ("Program") and to support the development of the desired future state, including recommendations for future improvements.

Capability Maturity Model

The assessment consisted of leveraging D&T's proprietary Capability Maturity Model ("CMM") to gain an understanding of the current processes and systems. The CMM is a proprietary framework used to assess the extent to which current risk management programs and activities are consistent with desired future state based current risk profile, business model, and industry sector.

The CMM consists of four major dimensions: Governance, Process, People and Technology. These dimensions serve as baseline to assess the current state and identify the desired future state across three evolutionary levels (Developing, Prevalent, and Leading). The assessment is summarized in the exhibit below and the details can be located in the appendix of this report.

How was the CMM used and what activities were involved?

The CMM is used to assess the current state of a company's existing risk management program and help determine future state aspirations. D&T approached the risk assessment by collecting and evaluating data, conducting discussions with key stakeholders, and developing findings and recommendations.

The CMM activities included the following:

- Gain an understanding of DME's current energy risk management governance structure, control activities, resources and technology, including the possible risks assumed by DME with the creation of the EMO
- Conduct discussions with specific Owner and DME personnel involved in the execution of the EMO program in order to develop an in-depth understanding of EMO's existing activities.
- Identify potential gaps and develop recommendations utilizing our proprietary Capability Maturity Model
- Review our findings and recommendations with appropriate Owner and DME personnel
- Advise DME management in their preparation for specific stakeholder discussions (e.g. Board of Directors, senior management, City Council) to gain agreement and consensus on their desired future state program

Report contents and organization

The following report provides recommendations for DME’s consideration as part of an effort to support the continued development of the energy and risk management program. Our services included interviews with DME personnel and a review of pertinent documents, but did not include testing the controls and processes of any of DME’s existing energy and risk management operations. During our interviews at DME, D&T focused on gaining an understanding of DME’s current capabilities and risk management processes, as well as gathering input on the desired future state of the Program at the company. Through these discussions, DME management highlighted certain points as being important to the organization’s current and future risk management approach. Further, D&T was able to make observations and recommendations to support the future state of the Program. These observations and recommendations were made based upon our understanding of the company’s strategic objectives, risk tolerance, culture and existing organizational structure. Taken together with D&T’s view of leading practices at peer companies, the following high-level common themes were noted as they relate to the desired future state of the Program at DME.

Executive Summary

During our interviews with DME, we gained a thorough understanding of the design and operation of DME’s energy and risk management program and objectives. Through these discussions, DME highlighted certain points as being important to the organization’s approach to executing risk management capabilities. This information was used to enable us to make observations based on specific program elements that are of particular importance to the energy and risk management program, especially in its risk management objectives, governance and oversight, reporting facilitating systems, and effective organizational structures. Taken together with Deloitte & Touche LLP’s view of common practices across the municipal power industry, the following summary of the results of the assessment was prepared and several high level observations were made:

Maturity Stages of Trading and Risk Management Capabilities				
	Developing	Prevalent	Leading	Recommendations
				Select Risks
Governance 	C Current State	F Recommended State		• High Priority: 12 • Medium Priority: 10 • Low Priority: 2 • Operational Compliance Risk • Market Risk • Regulatory Compliance
Process 	C	F		• High Priority: 2 • Medium Priority: 8 • Low Priority: 15 • Liquidity Risk • Commodity Price Risk • Model/System Risk • Physical Delivery Risk • Transaction Processing • Operational Compliance Risk
People 	C	F		• High Priority: 1 • Medium Priority: 2 • Low Priority: 0 • Operations Compliance Risk
Technology 	C	F		• High Priority: 1 • Medium Priority: 3 • Low Priority: 4 • Systems Risk • Transacting Processing Risk • Operational Compliance Risk • Market Risk • Credit Risk

High, medium and low priorities were determined based on D&T’s understanding of common and leading industry practices and our view of the risk mitigation benefits of implementing the recommendation.

Observation #1: A strong and clearly defined committee hierarchy is a key component in a strong hedge program. A common industry practice includes creating cascading levels of responsibilities from a primary oversight body (e.g. City Council or Public Utility Board) to a Risk Management Committee and down through the organization via a Director of Risk or similar role. It is clear that DME has given much thought and put forward significant effort to design a governance and oversight hierarchy appropriate to the energy and risk management objectives; however, there are opportunities to restructure the governance hierarchy to facilitate a streamlined oversight process while still involving the same key oversight groups.

Observation #2: The energy and risk management program’s governance documentation is a series of key supporting documents that help clearly articulate and codify oversight responsibilities throughout the organization while defining the overall risk management

program framework and how the organization should promote compliance with the program. The governance documentation may consist of multiple documents, but starts with a single document referred to as the Risk Policy ("Policy"). Based upon our review of DME's documentation, most, if not all, of the common elements are in place and the document is consistent with common industry practices. The following governance recommendations, we have identified several areas where enhancements could be made to further strengthen the Risk Policy as well as subordinate procedure manuals.

Observation #3: In addition to adding the appropriate governance and oversight, DME should also ensure that a clearly defined process for setting objectives, designing hedge strategies, and testing each hedge strategy is developed and executed. This is a key step in developing an effective hedge program.

This process should start with an assessment of DME's risk profile and should serve as a foundation for the development of a risk appetite and specific objectives. This should help the organization hypothesize a set of risk management program objectives. Typical objectives include:

- Rate-at-risk
- Earnings at-risk
- Hedge losses at-risk
- Credit and collateral at-risk

DME should better understand how different hedge strategies that may potentially reduce exposure in DME's portfolio and ensure the financial outcomes are consistent with the corporate objectives and risk appetite. The step to fulfill that process should include rigorously testing how different sets of hedging decisions perform over time and the outcomes of those hedge decisions compare to the hypothesized program objectives. This is intended to create an understanding of the types of outcomes to be executed, educate the organization and oversight authorities about the specific risk strategy which will be executed, and ensure that surprises are minimized. Finally, it helps to create a better understanding for how effective a particular hedge strategy is in achieving the program's objectives. The analysis should help define the specific risk limit values for the fiscal year and should be formally documented in the RMP and monitored by the Middle Office. Hedge strategies should be simulated and tested and reviewed at least annually.

Observation #4: DME has several different systems, tools and spreadsheet to help support the various groups and functions; however, it is currently unclear as to how DME will support the capture, valuation, risk quantification and reporting going forward. As DME moves forward, it will be important to ensure a fit-for-purpose technology solution is developed to support the execution of the hedge program. While the solution could range from spreadsheet-based to a fully implemented Energy, Trading, and Risk Management ("ETRM") system, important consideration should be given to providing the appropriate functionality.

Key areas to focus on include:

- Risk quantification – at a portfolio-level
- Risk reporting capabilities – at a portfolio-level
- Position reporting
- Credit risk measurement and reporting
- Compliance and monitoring – at transaction, user, and portfolio-levels
- User roles and responsibilities
- Automated price, volatility, and correlation feeds/calculations
- Dashboard and summary level reports

The ability to address these capability areas should create greater transparency and support the higher level of oversight needed in the Program.

Capability Maturity Model Capabilities

Governance	People	Process	Technology
• Risk Governance Hierarchy • Risk Management Policy • Hedge Program Design • Delegation of Authority	• Knowledge Sharing • Training and Development • Roles and Responsibilities • Adequacy of Resources • Risk Department Structure	• Product Requirement Forecasting & Planning • Pre-trading activities • Pre-trade analytics • Position, P/L, Risk Reporting • Stress-testing • Settlement • Accounting • Controls • Credit	• Data/Risk Inputs • Reporting • Controls

Capability Maturity Model Sub-Capabilities

Governance	People	Process	Technology
• Risk Governance Hierarchy • BOD Oversight • Risk Management Committee • Segregation of Duties ("SOD") • RMP Policy and Administration • Policy Updates • Objective-setting and Hedge Strategy Design • Risk Profiling and Hedge Strategy Analysis • Risk Appetite • Risk Limits • Book Structure • Delegation of Authority ("DOA")	• Knowledge Sharing • Roles and Responsibilities • Adequacy of Resources • Risk Department Structure	• Communication • Master Agreements • New Products • Tactical Meetings • Trade Analysis and Comparison Against Limits • Position Reporting • Mark-to-Market Process • Market Data Sourcing • Limit Reporting and Monitoring • Management Reporting Format and Frequency • At-Risk Measures • Scenario Analyses • Back testing Risk Measurements • Actualization • Settlement Discrepancies • G/L Reconciliation - Realized and Unrealized P&L • Links between hedge and exposure • Controls Processes • Credit Rating Methodology, Limit Setting, and Review • Collateral Management	• Visibility of All Risks / Commodities • Deal Capture • Review and Approval of Market Data Sourcing and Valuation Methodologies • Planned Reporting • Confirmations • Transaction Completeness and Accuracy • End of Day Processing

Risks

Market Risk	Credit Risk	Operations Risk	Other
• Liquidity Risk • Commodity Price Risk • Congestion Risk • Basis Risk • Load Servicing /Following Risk	• Financial Counterparty Default Risk • Physical Delivery Risk	• Systems Risk • Transaction Processing Risk • Operational Compliance Risk ◦ Policy ◦ Administration ◦ DOA ◦ SOD • Regulatory Compliance Risk	• Model Risk • Asset/Performance Risk • Renewable Variability Risk

Detailed Governance Recommendations

Capability	Sub-Capability	Current State	Recommendations	Risk	Priority
1.1 Risk Governance Hierarchy	1.1.1 Risk Governance Hierarchy	The Energy Risk Management Policy ("ERMP") outlines the following risk governance hierarchy: (1) The City Council ("CC") delegates the executive oversight of the DME to the Strategy Committee ("SC"); (2) The Public Utilities Board ("PUB") is an intermediary that provides recommendations to the SC and CC; (3) The SC's responsibilities include ensuring program strategies are consistent with overall City goals and obligations as well as has the authority to approve certain program element; and (4) The Operational Committee ("OC") reviews executed transactions, monitors proximity to transaction limits, and oversees implementation of DME's strategic plan with regard to management of DME's energy portfolio. While the risk governance framework is documented within the ERMP and the Energy Management Organization ("EMO") Procedures Manual, the execution of the oversight does not currently take place as originally designed. The Procedures Manual as currently written is outdated, in part likely due to turnover at DME, City Council, PUB, and in the City Manager's department. Examples of EMO activities that differ from the ERMP/EMO Procedures Manual include: • Reporting to the CC/PUB • SC/OC meetings and reporting • Annual review and approval of the ERMP • Rate-at-Risk metric	Recommendation 1.1.1 R1: Review the current Energy Risk Management Policy ("ERMP") and determine whether the governance hierarchy, as originally designed, continues to be the appropriate oversight model. Refer to Recommendation 1.1.3.R1 R2: Update the ERMP and the EMO Procedures Manual to reflect day-to-day, monthly, quarterly and annual practices within the organization, as well as the commercial and risk oversight strategy going forward. Obtain an annual acknowledgement of the ERMP, and subordinate appendices, procedures and documents, from relevant employees. Refer to Recommendation 1.2.1.R3	R1: Operations Risk R2: Operations Risk	R1: High R2: High
1.1 Risk Governance Hierarchy	1.1.2 BOD Oversight	Based on conversations with the DME staff, it appears that there have been fewer CC/PUB meetings than required by the EPRM. As mentioned above, some of this is likely due to changes in the composition of DME personnel, the City Council and the PUB. Risk management reports have not been consistently delivered to the Council and PUB by DME. As an example, it is D&T's understanding that only one CC meeting has been conducted since EMO operations have begun.	Recommendation 1.1.2. R1: Determine the appropriate meeting frequency for DME risk reporting to the CC. The frequency should be consistent with the level of oversight required of the CC and there should be a pre-defined standing agenda. Reporting should include pre-reads to be provided to the CC with enough lead time to allow the CC to review the report and prepare for the meeting. R2: Develop a quarterly risk management report with the appropriate detail to support the CC's oversight responsibilities. This could include key portfolio risk metrics, risk limits and hedging compliance status, market conditions and other risk data that will equip the CC with the information necessary to make decisions and provide governance oversight. Suggested reporting topics include: • Executive summary of forward transacting activity • Market conditions • Noteworthy news items (e.g. energy, counterparty, regulatory) • Reporting on risk limits, including status of key objectives (e.g. FY benchmark) • Non-compliance with limits and other ERMP requirements • Upcoming activities/decisions (e.g. risk policy review/updates, hedge strategy update, congestion analysis) R3: Develop and deliver periodic training to the CC/PUB. The training should include the fundamentals of energy markets and commodity trading in order to provide the CC/PUB with a better understanding of the utility operations and the risk management program. This will help facilitate more productive risk meetings with the CC/PUB.	R1: Operations Risk R2: Operations Risk R3: Operations Risk	R1: High R2: Medium R3: Medium

Capability	Sub-Capability	Current State	Recommendations	Risk	Priority
1.1 Risk Governance Hierarchy	1.1.3 Risk Management Committee	The ERMP delineates the roles and responsibilities of the SC, which is responsible for the development of the risk strategy, while the OC is focused on monitoring the execution of the strategy by the Front Office. The SC responsibilities include: - Quarterly meetings - Responsible to the CC/PUB for executive oversight - Report results of the EMO activities and compliance with the policy to the CC/PUB on an annual basis The OC responsibilities include: - Reporting to the SC on policy compliance - Market condition - Projected future forecasts - Financial results From discussion with DME staff, the frequency of meetings has not been consistent, as required by the ERMP. Additionally, it is D&T’s understanding that the SC and OC have conducted joint meetings to discuss operations as well as strategy.	Recommendation 1.1.3. R1: Consider establishing a single Risk Management Committee (“RMC”) using a hybrid of both the existing SC/OC to provide oversight of the Front Office (“FO”), Middle Office (“MO”), and Back Office (“BO”). It is recommended that the RMC consist of senior personnel that represent a cross—section of the organization in order to provide transparency between DME and the CC/PUB. We recommend that the RMC consist of the following members: - Deputy City Manager/COO - General Manager - Division Manager, Regulatory & Risk - Executive Manager, Power, Regulatory & Legislative Affairs - Business Manager, Finance Dept. Electric Administration - Deputy City Attorney – Legal R2: Establish a chairman to oversee the RMC. The Chairman of the RMC should maintain voting rights and should be the primary liaison between the City Council, General Manager, and the RMC. The Chairman should also have the responsibility for overseeing the day-to-day efforts of the risk control function. At a high-level, these responsibilities will include understanding and measuring market risk, validating risk mitigation activities, hedge strategy compliance, and risk reporting. Additional resource(s) should provide analytical support to the Chairman so that he/she may fulfill day-to-day oversight responsibilities. R3: Establish appropriate and consistent guidelines for conducting RMC meetings. The RMC should maintain quorum and voting procedures and should be responsible for overseeing and executing the requirements of the risk policy and procedures. The voting procedures, including tie-break provisions, should be documented within the ERMP. R4: Risk Management Committee meetings should be regularly scheduled, perhaps quarterly, and a standard set of reports should be prepared and distributed by the Chairman in advance of the meeting.	R1: Operations Risk Regulatory Compliance Risk Market Risk	R1: High
				R2: Operations Risk	R2: Medium
				R3: Operations Risk Market Risk	R3: Medium
				R4: Operations Risk	R4: High
1.1 Risk Governance Hierarchy	1.1.4 Segregation of Duties	The FO, MO, and BO responsibilities are documented in the ERMP and EMO Procedures and are understood by DME staff. However, it is D&T’s understanding that all the responsibilities as outlined are not always adhered to. While in the most recent organization chart, the MO is independent from the FO organization, the BO currently reports into the FO. It is atypical to have the BO report into the FO.	Recommendation 1.1.4. R1: Review and update the organizational chart on an annual or as-needed basis to account for any material organizational changes. Adjust any policies and procedures that reference the organizational chart to ensure consistency. Additionally, consider updating job descriptions in order to help ensure that all DME personnel understand their role in the energy and risk management program. R2: Consider moving the BO group (i.e. Energy Services) to a group within the utility that is independent of the FO to avoid any potential segregation of duties conflicts and to better align business units with the similar objectives.	R1: Operations Risk	R1: Medium
				R2: Operations	R2: Low

Capability	Sub-Capability	Current State	Recommendations	Risk	Priority
			the ERMP, RMP, and any related EMO Procedure Manuals to allow all employees in the FO, MO, and BO access to the documents. • Refer to Recommendation 1.2.1.R4		
1.3 Hedge Program Design	1.3.1 Objective-setting and Hedge Strategy Design	While there is a clear consensus to manage end-user electricity rates for the City of Denton residents, it is not clearly defined how the objective will be met. Hedging and/or transacting decisions appear disconnected from these objectives and are more typical of a hedge program that is driven by market fundamentals rather than risk metrics and a clearly defined hedge strategy.	Recommendation 1.3.1. R1: A hedge strategy should be designed, implemented, and documented within the ERMP. The objectives and hedge strategy design process should be clearly documented, measurable, and rigorously tested via simulation. In the event that hedge decisions do not achieve program objectives, steps should be clearly defined to determine why the objectives weren't achieved and how to re-align hedge decisions with program objectives to promote improved effectiveness. R2: At least annually, re-perform the hedge strategy simulations to confirm or update DME's ongoing strategy. An annual process will help to foster better understanding of how different hedge strategies may potentially reduce the natural exposure of DME's portfolio and ensure financial outcomes consistent with the utility's objectives and risk appetite. This analysis will also help define specific risk limit for that fiscal year that can be used to assess performance of the energy and risk management function. These risk limits would in turn be formally documented in the ERMP and monitored by the MO.	R1: Operations Risk Market Risk R2: Operations Risk Market Risk	R1: High R2: Medium
1.3 Hedge Program Design	1.3.2 Risk Profiling and Hedge Strategy Analysis	While there is ample evidence that a robust and thorough planning and fundamental analysis process exists, there is less evidence that the process considers the risk exposure of the unhedged native business (i.e. the exposure to over/under supply of electricity to meet customer demand). A risk profile helps to establish the utility's willingness to take risks, while quantitatively defining the exposure to price risk. A risk profile can aide in the development of the utility's objectives.	Recommendation 1.3.2 R1: Quantify DME's risk profile at least annually. The MO should be responsible for quantifying the risk exposure of the native business, excluding hedges. This should include DME's exposure to both price and volumetric uncertainty. The risk profile should be based upon the most recent forecasts of energy product purchases and sales and be translated into the context of risk metrics relevant to the business (e.g. rates-at-risk, cost-at-risk, mark-to-market at risk etc.). Refer to Recommendation 1.3.1.R2	R1: Operations Risk Market Risk	R1: High
1.3 Hedge Program Design	1.3.3 Risk Appetite	The DME's risk appetite and tolerances are not clearly defined. There is evidence that DME has identified, defined, and documented in the ERMP certain risks that the utility is exposed to through energy management operations (i.e. basis risk, credit risk, liquidity, market risk); however, there is no clear link to risk appetite or risk tolerance.	Recommendation 1.3.3 R1: Consider defining and quantifying DME's risk appetite and tolerances in order to establish a framework for communication with the CC and PUB moving forward. The risk profile should quantify the utility's risk exposure and provide a quantitative data point for articulating the utility's risk appetite. This should cascade into clearly defined risk tolerance and risk limits.	R1: Operations Risk Market Risk	R1: Medium
1.3 Hedge	1.3.4 Risk Limits	There are transaction authorization limits established for the FO but no risk limits. Based upon our review of the EMO Procedures Manual, a rate at-	Recommendation 1.3.4. R1: Consider developing and implementing risk limits clearly linked to a	R1:	R1: High

Capability	Sub-Capability	Current State	Recommendations	Risk	Priority
Program Design		risk metric was identified, but not currently being used, and thus there are no risk limits associated with the metric.	financial objective such as rate at-risk. The RMC should maintain the responsibility for reviewing and approving portfolio risk limit structures and trading authorities within the parameters provided by the CC. The RMC should monitor compliance with established risk limits via monthly RMC meetings and the MO should be responsible for monitoring them on a daily basis. Risk limits should be clearly defined and quantifiable. Some examples of potential risk metric that could form the basis for relevant risk limits include: • Rate at-Risk • Cash Flow at-Risk • Mark-to-Market at-Risk • Credit and Collateral at-Risk The development of the risk limits should be accompanied by pre-approved risk mitigation strategies (or hedge decision frameworks) for addressing limit breaches. This will allow for the rapid mitigation of exposure should commodity prices and/or volatility move unfavorably for DME.	Operations Risk Market Risk	
1.3 Hedge Program Design	1.3.5 Book Structure	The current energy trading risk management (“ETRM”) system lacks the capability to appropriately define DME’s book structure. This in turn limits the organization’s ability to support reporting in the format and granularity required by management and oversight bodies. DME is currently in the process of identifying and acquiring a system capable of supporting the book structure and reporting requirements.	Recommendation 1.3.5. R1: Once a new ETRM system has been identified and implemented, the book structure should be documented in the EMO Procedures Manual, approved by the RMC, and embedded in the ETRM system. The book structure should be re-evaluated on a periodic basis to ensure alignment with the utility’s goals and objectives.	R1: Transaction Processing Risk	R1: Medium
1.4 Delegation of Authority (“DOA”)	1.4.1 Delegation of Authority (“DOA”)	The most recent Delegation of Authority memorandum (Authority to Transact 7-7-17 Update), lists authorized transactions that are inconsistent with Appendix A and Appendix E of the ERMP.	Recommendation 1.4.1. R1: Reconcile the DOA memorandum with the ERMP. Ensure that the DOA memorandum does not extend authority that is different/inconsistent with the ERMP. Refer to Recommendation 1.2.1.R1 Refer to Recommendation 1.2.1.R2	R1: Operational Compliance Risk	R1: High

Detailed People Recommendations

	Capability	Current	Recommendation	Risk	Priority
2.1 Knowledge Sharing	2.1.1 Knowledge Sharing	The EMO regularly develops and delivers educational material to facilitate ongoing knowledge transfer within DME, the CC and the PUB. Regular weekly meetings are held to discuss pertinent items and activities and provides an effective vehicle for informal education and knowledge sharing.	Recommendation 2.1.1 R1: Continue to develop and deliver training to facilitate the knowledge transfer necessary to support the oversight requirements and execution of the utility’s risk management strategy. Consider increasing the frequency of such trainings in the short term to help offset the rapidly changing organization. Potential training topics include: - Hedge accounting - Risk modeling and analysis - Risk assessment - Market risk - Credit risk R2: Encourage professionals to interact across the FO, MO, and BO either within the organization or with other organizations. Participation in events (i.e. lunch & learns) should allow individuals to get exposure outside of their day-to-day responsibilities and allow individual growth in their professional career. This will also help offset the recent organization changes and attrition.	R1: Resource Adequacy Risk Knowledge Management Risk R2: Resource Adequacy Risk Knowledge Management Risk	R1: Medium R2: Medium
2.2 Roles, Resources, and Structure	2.2.1 Roles and Responsibilities	The FO, MO, and BO roles and responsibilities are formally documented in the ERMP and the EMO Procedures Manual, but due to the recent changes in the organization, the individuals performing the activities have significantly changed.	Refer to Recommendation 1.1.1.R2		
2.3 Roles, Resources, and Structure	2.3.1 Adequacy of Resources	The organization has become leaner over the last year due to a number of reorganizations and personnel departures. This has resulted in the remaining individuals being more highly utilized and generally increased the level of responsibility for energy and risk management activities at all levels of the utility. This is especially true in the MO, where currently, there is a single resource (Senior Risk Control Analyst) responsible for performing all day-to-day and periodic MO functions. This includes, but is not limited to: - Risk reporting - Monitoring of risk policy compliance - Contracts negotiation - Credit risk management - Transacting compliance There does not appear to be a backup or redundant resource to support the MO function.	Recommendation 2.3.1 R1. Consider cross-training resources to create an appropriate level of redundancy across the front, middle and back offices. Refer to Recommendation 2.1.1.R1 Refer to Recommendation 2.1.1.R2	R1: Resource Adequacy Risk Knowledge Management Risk	R1: High
2.4 Roles, Resources, and Structure	2.4.1 Risk Department Structure	The Senior Risk Control Analyst reports directly to the Interim Division Manager, Regulatory & Risk, which is functionally separate from the trading function.	None		

Detailed Process Recommendations

Capability	Sub-Capability	Current	Recommendation	Risk	Priority
3.1 Product Requirement Forecasting & Planning	3.1.1 Communication	DME deploys a forecasting process which is benchmarked against multiple external models (i.e. PRT and OSI) on a regular basis. In addition, there are detailed desk procedures to facilitate the following: - Development of the load forecast - Identify the available generation resources - Calculate the net position - Identify the power requirements to balance the position. Since the current forecasting methodology selection and approval process is not documented in the EMO Procedures, it is unclear whether the forecasting methodologies have been formally reviewed and approved by the SC/OC.	Recommendation 3.1.1. R1: Consult with the RMC to determine if the load forecasting methodology approval process should be documented in the governance documentation. If it should be, review and approve the methodology and assumptions. The requirement to review and approval the methodology should be documented in EMO Procedures Manual.	R1: Operations Risk Load Serving / Following Risk Congestion Risk Basis Risk Asset/ Performance Risk	R1: Medium
3.2 Pre-trading activities	3.2.1 Master Agreements	The Senior Risk Control Analyst works in parallel with Legal to negotiate master agreements (i.e. EEI, NAESB, ISDA, exchange/broker agreements). DME is currently negotiating their 1st ISDA master agreement.	Recommendation 3.2.1. None		
3.2 Pre-trading activities	3.2.2 New Products	A new product approval process does not exist.	Recommendation 3.2.3. R1: Develop a new product review and approval processes. The process should be clearly documented in the EMO Procedures Manual, including: - Approval process by the RMC - Requirements to be reviewed and updated annually - Assessment of the risks, benefits and suitability relative to DME’s energy and risk management objectives - Assessment of the impact to system requirements prior to trading the new product	R1: Operations Risk	R1: Low
3.3 Pre-trade analytics	3.3.1 Tactical Meetings	The EMO conducts weekly meetings to provide regular operational updates to all relevant functions involved with the energy and risk management program. However, given the current lack of defined energy and risk management objectives and a clearly articulated hedge strategy to achieve the objectives, the meetings and discussions are primarily operationally focused.	Recommendation 3.3.1 R1: Given recommendations R1.3.1 – R1.3.3 above, it will be important to evolve the agenda and discussion topics of the weekly meetings to include a review of the following: - Current objectives - Compliance with risk limits - Required hedging activity - Emerging risks - Key topics for presentation to RMC	R1: Operations Risk	R1: Medium
3.3 Pre-trade analytics	3.3.2 Trade Analysis and Comparison Against Limits	The FO has access to daily position and credit reports created by the MO to support trader decision making; however, it is unclear whether there is sufficient detail or review of the reports to support a comparison of transacting volume against transacting limits. Additionally, as identified above, there are some gaps in the commodity/instrument/risk limits that	Recommendation 3.3.2. R1: Establish a process and develop a report to monitor daily compliance with all risk and hedge strategy compliance limits. This should include the distribution of appropriate risk limit compliance reports to FO, MO, BO, and oversight bodies. The FO should review the risk limit compliance report	R1: Market Risk	R1: Medium

Capability	Sub-Capability	Current	Recommendation	Risk	Priority
		would necessitate additional trade analysis and limit monitoring.	before any transactions are executed. The MO should report non-compliance with approved risk limits when necessary and escalate issues when non-compliance is not remedied within a pre-defined and approved period of time. Refer to Recommendation 1.3.4.R1 Refer to Recommendation 1.2.1.R6		
3.4 Position, P/L, Risk Reporting	3.4.1 Position Reporting	The MO tracks the positions via spreadsheets due to limitations identified in the existing ETRM. Prior to distributing position reports, the MO reviews positions for completeness and accuracy; however, as noted above, the limited risk control resources result in the same resource developing and reviewing the position reports.	Recommendation 3.4.1 R1: Ensure that the proposed vendor for the new ETRM provides functionality to create and distribute an automated position report. Where possible, leverage the automated position reporting to avoid inaccuracies when developing it manually. In the event that manual reporting remains, identify an additional resource to perform the quality control review that occurs prior distribution of the report.	R1: Systems Risk Transaction Processing Risk	R1: Medium
3.4 Position, P/L, Risk Reporting	3.4.2 Mark-to-Market Process	The MO leverages a third-party price vendor and imports prices into an Excel workbook to calculate the MtM on a daily basis. The FO also receives independent prices, which are used to perform valuations in the existing ETRM. These prices are different from the third-party prices used by the MO. On a periodic basis, a reconciliation is performed between the MO and FO valuations. However, the book of record remains with the MO.	Recommendation 3.4.2. R1: Ensure that the proposed vendor for the new ETRM system provides functionality to automate the MtM and P&L process. Additionally, as part of the ETRM implementation, develop a single process for sourcing price data and quantifying the MtM. The daily MTM and/or P&L reports should be available to all interested parties, while senior management should receive weekly and/or monthly reports. There should be general acknowledgement that the P/L is accurate and differences should be documented and/or explained.	R1: Systems Risk Transaction Processing Risk	R1: Medium
3.4 Position, P/L, Risk Reporting	3.4.3 Market Data Sourcing	DME currently receives multiple prices data sources for forward and spot prices. The EMO Procedures Manual contains high level procedures for managing the forward price curves, but lacks specificity on the detailed approach.	Recommendation 3.4.3. R1: Expand the market data sourcing and valuation methodologies in the EMO Procedures Manual. As part of the procedures, the data sourcing procedures should also include: - How broker quotes, exchange prices, and data publishers are identified and validated - When it was approved by the RMC - A process to review and update it annually - Description for how it should be developed and maintained by the independent MO function The forward curve development and modification procedures should include: - Identification of the market data sources for all forward and spot prices, risk free interest rates, and implied volatilities used to support the valuation of all trade types approved for trading and risk management (including new products such as financial swaps and options). - Description of cleaning, validating, and formatting the data - Descriptions of any price curve extension methodologies	R1: Commodity Price Risk Operations Risk	R1: Medium

Capability	Sub-Capability	Current	Recommendation	Risk	Priority
			Descriptions of any illiquid price curve creation		
3.4 Position, P/L, Risk Reporting	3.4.4 Limit Reporting and Monitoring	As discussed above, while the MO develops and distributes a position report on a daily basis, it is unclear whether the data provided in the report is compared against limits. Additionally, it is unclear whether the report allows key stakeholders the ability to monitor compliance against limits defined in the ERMP.	Refer to Recommendation 3.3.2.R1		
3.4 Position, P/L, Risk Reporting	3.4.5 Management Reporting Format and Frequency	The FO/MO provides standard reports to both the SC/OC/PUB, which include: - Credit Exposure Report (Monthly) - Energy Market Risk Report (Quarterly) - Transaction Performance Report (Quarterly). However, there is not a standard report format that is defined for the CC. In addition, there have been fewer reports provided to the CC than were required by the ERMP.	Recommendation 3.4.5. R1: Consider developing a standard reporting packing for the CC. This could follow a similar format to the standard PUB reporting package. Refer to Recommendation 1.2.2.R2	R1: Operations Risk	R1: Medium
3.4 Position, P/L, Risk Reporting	3.4.6 At-Risk Measures	Per the EMO Procedures Manual, the financial exposure of DME’s Total Portfolio Account shall be managed based on a rates at-risk (RaR) basis for the upcoming 12-24 month period. During discussions, it was confirmed that RaR is not used in practice.	Recommendation 3.4.6. R1: MO should reconsider the at-risk metrics and measurement methodologies within the EMO Procedures Manual and ensure they are updated at least annually. R2: The MO should prepare a daily portfolio-level risk report. The report should be distributed on a daily basis to all members of the FO, MO, BO, and RMC. If DME decides that a RaR approach doesn’t make sense for the utility, other of risk metrics might include: - Mark-to-Market at-Risk - Credit and Collateral at-Risk - Value at-Risk - Cash Flow at-Risk When determining the appropriate risk metric, consideration should be given to the hedge strategy and program objectives. This report should support monitoring compliance with the corporate risk objectives and limits approved by the RMC. R3: An independent resource should periodically conduct a review of the daily portfolio-level risk report. The review should focus on the accuracy, frequency and distribution of the reports generated by the MO.	R1: Market Risk Credit Risk R2: Market Risk Credit Risk R3: Operations Risk Model Risk	R1: High R2: High R3: Low
3.5 Stress-testing	3.5.1 Scenario Analyses	Scenario analysis and/or stress tests have not been conducted on a periodic basis.	Recommendation 3.5.1. R1: The MO should perform regular stress-tests to ensure ongoing validity of any at-risk metrics. Refer to Recommendation 3.4.6.R1 and R2 Refer to Recommendation 1.1.1.R2	R1: Model Risk Commodity Price Risk	R1: Low

Capability	Sub-Capability	Current	Recommendation	Risk	Priority
3.5 Stress-testing	3.5.2 Back testing Risk Measurements	Back-testing of risk measurement metrics is not performed.	Recommendation 3.5.2. R1: MO should perform back testing of at-risk measurements annually. This analysis should provide feedback and inform the calibration of risk measurements methodology. R2: Incorporate the updated back testing process in the EMO Procedures Manual. The procedures should include documentation of the assumptions and procedures for performing annual back testing on risk measurements. R3: An independent resource should periodically conduct a review of the back testing results and methodology. The review should focus on the accuracy and frequency of back testing analysis generated by the MO.	R1: Model Risk Commodity Price Risk R2: Operations Risk R3: Operations Risk; Model Risk	R1: Low R2: Low R3: Low
3.6 Settlement	3.6.1. Actualization	While the settlement and actualization process is mostly manual, there are processes in place to minimize errors and provide a quality control check on the data imported into Excel spreadsheets. The spreadsheets including tracking of nominated (estimated) and actualized volumes, costs, revenues, and other actual data. Any discrepancies are investigated and researched in a timely manner.	Recommendation 3.6.1. R1: Where possible, consider whether certain data such as prices, volumes, etc. can be retrieved and electronically integrated with the ETRM system.	R1: System Risk Transaction Processing	R1: Low
3.6 Settlement	3.6.2 Settlement Discrepancies	Settlement discrepancies are handled manually but in a timely fashion; however, there are no formal logs to track the discrepancy and/or its resolution. Historically, there have been few settlement discrepancies with ERCOT, and there has been only one settlement discrepancy with a counterparty.	Recommendation 3.6.2 R1: Consider developing a formal settlement discrepancy tracking and resolution log. The log would provide a clear audit trail of the nature of the discrepancy, the means of resolution, and the timing of the final resolution.	R1: System Risk Transaction Processing Risk	R1: Low
3.7 Accounting	3.7.1 G/L Reconciliation - Realized P&L	Regular reconciliations are performed by the BO for the realized P&L. Any discrepancies are investigated and researched in a timely manner; however, there are no formal logs to track the discrepancy and/or its resolution.	Recommendation 3.7.1 R1: Consider developing a formal realized P&L discrepancy tracking and resolution log. The log would provide a clear audit trail of the nature of the discrepancy, the means of resolution, and the timing of the final resolution.	R1: Transaction Processing Risk	R1: Low
3.7 Accounting	3.7.2 G/L Reconciliation - Unrealized P&L	Regular reconciliations are performed by BO for the unrealized P&L. Any discrepancies are investigated and researched in a timely manner; however, there are no formal logs to track the discrepancy and/or its resolution.	Recommendation 3.7.2 R1: Consider developing a formal realized P&L discrepancy tracking and resolution log. The log would provide a clear audit trail of the nature of the discrepancy, the means of resolution, and the timing of the final resolution.	R1: Transaction Processing Risk	R1: Low

Capability	Sub-Capability	Current	Recommendation	Risk	Priority
3.7 Accounting	3.7.3 Links between hedge and exposure	There does not appear to be a formal link between executed hedges and the item it is a hedge against.	Recommendation 3.7.3. R1: Either within the ETRM system or via a manual process, document the link each transactions (hedge instrument) and the exposure it is intended to hedge (hedged item). There should be adequate documentation and review of the link between the hedge and the hedged item. The requirement to document the link should be included in the EMO Procedures and the detailed process to document the link in the desk procedures.	R1: Transaction Processing Risk	R1: Low
3.8 Controls	3.8.1 Controls Processes	There is limited evidence that a robust control framework governs the energy and risk management program. There is limited documentation, outside the ERMP Policy or the EMO Procedures that details the control objectives, control activities, or frequency of review.	Recommendation 3.8.1. R1: A framework should be developed, documented and utilized to help control the energy and risk management activities. The controls should include the control objective, activity and type (i.e. detective, preventive), the frequency of control, the control owner, and detailed description of the control. R2: Periodically, an independent review of the following controls should be performed: • Deal capture • Trade execution • Data sourcing and valuation methodologies • Risk limit compliance • Risk management program compliance • Credit limit compliance • Annual credit assessments • User roles and permissions and regular updates • ERMP Policy compliance • EMO Procedures compliance	R1: Operations Risk R2: Operations Risk	R1: Medium R2: Low
3.9 Credit	3.9.1 Credit Rating Methodology	Although there is an established credit rating methodology for calculating counterparty credit ratings independently of the rating agencies, it has not been reviewed since the approval of the ERMP and/or the EMO procedures.	Recommendation 3.9.1. R1: Evaluate if the current methodology should be updated or if it is still a relevant methodology to use as DME adds new counterparties. Review the EMO Procedures Manual to determine whether the methodology is documented with enough detail. Additionally, should additional detail be required, consider whether it would be more appropriate to document the credit rating methodology in a desk level procedure rather than in the EMO Procedures.	R1: Credit Risk	R1: Low
3.9 Credit	3.9.2 Credit Limit Setting	It is unclear if the limit setting process has been reviewed once a limit has been approved.	Refer to Recommendation 3.9.3.R1		
3.9 Credit	3.9.3 Counterparty Creditworthiness Reviews	Counterparty creditworthiness is periodically reviewed by the MO using market intelligence reports from the credit rating agencies (i.e. S&P, Moody's and Fitch), financial data obtained from 10-Ks and 10-Qs;	Recommendation 3.9.3. R1: MO should evaluate whether the EMO Procedures Manual for credit evaluations should be updated. The MO should perform the credit evaluation assessment for all active counterparties per frequency set by the	R1: Credit Risk	R1: Low

Capability	Sub-Capability	Current	Recommendation	Risk	Priority
		however, per the ERMP, credit limits should be reviewed semi-annually. Through discussion, it was unclear if this requirement to review counterparty creditworthiness is followed as documented in the ERMP.	ERMP. The assessment should include the following: - Counterparty information - Historical payment history (average A/R days outstanding) - Description of customer relationship & business purpose - Credit rating history - Financial ratios & supporting factors for internal risk rating - News related to changes in business model, leadership, organization structure, M&A - Credit limit history - Recommended credit limit and approval from the Credit Manager - The date the assessment was performed Each counterparty assessment date should be monitored to ensure the ERMP frequency requirement is met. R2: Document a more detailed desk procedures based on the Counterparty Evaluations EMO Procedures Manual. Refer to Recommendation 1.2.1.R4	R2: Credit Risk	R2: Low
3.9 Credit	3.9.4 Collateral Management, Credit Limit Monitoring and Credit Reporting	The MO and BO work jointly to analyze collateral balances, requirements, and movements. The monitoring of collateral requirements is performed and reported on a regular basis. For ERCOT, there is a cash balancing account that has been setup to minimize the number of cash in/out flows. In addition, broker accounts are used to facilitate the variation margin and initial-maintenance margin with exchange.	No Recommendations	None	None

Detailed Technology Recommendations

Capability	Sub-Capability	Current	Recommendation	Risk	Priority
4.1 Data/Risk Inputs	4.1.1 Visibility of All Risks / Commodities	All deals are captured within the existing ETRM system; however, the system lacks many capabilities required to support DME’s energy and risk management program. Therefore, a significant number of processes are performed manually in spreadsheets. These include: • Price sourcing and validation • Transaction valuation • Position and credit exposure reporting • Settlement and actualization • Risk analytics • Pre-trade analysis • Limit monitoring	Recommendation 4.1.1. R1: As discussed above, DME should proceed with the process of identifying alternative ETRMs, selecting a fit-for-purpose system, and implementing it to support the ongoing energy and risk management objectives of the utility. Key considerations should be given to the manual process being performed in order to automate as much of the processes as possible.	R1: Systems Risk Transacting Processing Risk	R1: High
4.1 Data/Risk Inputs	4.1.2 Deal Capture	Both physical and financial deals are captured in the DME’s existing ETRM system; however, it is a manually labor intensive process to upload deals due to system limitations. Additionally, DME is limited in the types of transactions that can be executed due to an inability to accurately capture and value the transactions within the existing system.	Refer to Recommendation 4.1.1.R1		
4.1 Data/Risk Inputs	4.1.3 Review and Approval of Market Data Sourcing and Valuation Methodologies	The MO leverages a third-party price vendor and imports prices into an Excel workbook to calculate the MtM on a daily basis. The FO also receives independent prices, which are used to perform valuations in the existing ETRM. These prices are different from the third-party prices used by the MO. On a periodic basis, a reconciliation is performed between the MO and FO valuations. However, the book of record remains with the MO. Options data is obtained from public sources on a periodic basis; however, due to the system limitations and DME’s inability to execute options, the data is not regularly needed or used.	Recommendation 4.1.3 R1: Develop and clearly document a process for validating price and volatility data entered into the ETRM system and used in valuation methodologies. R2: Ensure there is appropriate segregation of duties between the FO and MO as part of the data sourcing (price and volatility) and mark-to-market process. The FO should input prices while the MO is responsible for validating the FO prices against independent pricing sources. Any material price differences outside of pre-defined tolerances should be investigated and resolved. Refer to Recommendation 3.4.3 R1	R1: Operational Compliance Risk Market Risk R2: Operational Compliance Risk Market Risk	R1: Medium R2: Medium

Capability	Sub-Capability	Current	Recommendation	Risk	Priority
4.2 Reporting	4.2.1 Planned Reporting	DME has limited capabilities to generate automated position, credit, and risk reports. Therefore, report generation is typically manual and may involve the use of multiple Excel workbooks.	Refer to Recommendation 4.1.1.R1		
4.2 Reporting	4.2.2 Confirmations	Confirmations are performed manually by a combination of the MO and BO. For physical products, the transactions are submitted to ERCOT, reviewed by both DME and the counterparty, and considered confirm when both parties validate the key terms. This prompts a manual review to compare what was reported to ERCOT with what was entered into the ETRM system. For futures/financial deals, the transactions, as entered into the system of record, are compared to counterparty/broker statements. The deal is reviewed and any discrepancies identified are investigated and remedied by the FO.	Recommendation 4.2.2 R1: Leveraging the ETRM system, ensure all transactions are appropriately tagged with a status (actual, pending, confirmed) and develop a trade status report to allow the FO, MO, and BO the required visibility into transacting activity. R2: In the event, a discrepancy exists between DME and the counterparty, both Front and Middle Office should communicate to resolve the error. Implement controls to prevent FO from editing traded. All edits should go through the MO. Refer to Recommendation 4.1.1.R1	R1: Transaction Processing Risk Operational Compliance Risk R2: Transaction Processing Risk Operational Compliance Risk	R1: Low R2: Low
4.3 Controls	4.3.1 Transaction Completeness and Accuracy	DME is limited in the types of transactions that can be executed due to an inability to accurately capture and value the transactions within the existing system. On a periodic basis, manual reconciliations performed.	Recommendation 4.3.1. R1: Develop a set of deal capture controls to ensure that transactions are entered timely, completely and accurately within the new ETRM system. R2: Review transaction capture controls on an annual basis. The review of the controls should be completed by a resource independent of the deal capture, validation, and confirmation process. Refer to Recommendation 4.1.1.R1	R1: Transaction Processing Risk Operational Compliance Risk R2: Transaction Processing Risk Operational Compliance Risk	R1: Low R2: Low
4.3 Controls	4.3.2 End of Day Processing	There is clear evidence of an end of day reporting process; however, it does not appear that the end of day processing is documented. This makes it difficult to understand whether the process is executed consistently, each day, across the FO, MO, and BO.	Recommendation 4.3.2. R1: Develop a list of required activities to be completed each day by the FO, MO and BO. These activities might include: - FO: - Deal checkout for all new trades - Review of risk limit compliance - Review of credit limit compliance	R1: Operational Compliance Risk Market Risk Credit Risk	R1: Medium

Capability	Sub-Capability	Current	Recommendation	Risk	Priority
			○ Review daily deal checkout ○ Review of valuation for open positions ○ Review daily P&L ○ Observance of authorized transaction limits and exposure boundaries • MO: ○ Trade validation ○ Execute confirmations ○ Perform independent price and volatility verification ○ Perform end-of-day pricing & formula validation ○ Perform end-of-day portfolio valuation ○ Perform market and credit risk measurement • BO: ○ Track and process transactions ○ Maintain customer information ○ Exchange invoices with counterparties ○ Perform P&L reconciliations ○ Prepare customer billings		

Appendix: Capability Maturity Model Detail

	Developing	Prevalent	Leading
1.1.1 - Risk Governance Hierarchy	Board of Directors (or equivalent) has limited understanding of market and credit risk aspects of the business. Risk authority and responsibility is loosely defined and is likely informally delegated within the organization. Definition of roles, responsibilities and authorities at the BOD and Risk Management Committee levels are only vaguely articulated and documented. There is a group that meets informally, but it does not necessarily have a formal structure, or a set schedule, or meeting agenda of required topics. The role of risk oversight is often taken on by the CFO or a VP of Credit, the VP of Finance, or the Controller a "part-time role". Roles and responsibilities are neither formally documented nor well understood across the organization. C	There is a defined organization structure in place where authority and responsibility is delegated from the highest level of the organization (BOD or their delegate) to the Risk Management Committee and then to the Risk Control Department. This delegation is moving towards increased formalization and documentation. There is a formal Risk Control Officer, which may or may not be in the C-suite, who typically chairs the RMC. This role has direct reporting authority to the BOD as well as the CEO. There is a Risk Management Committee, with a formal structure, and there is normally a set schedule, and agenda of required topics. Formal roles and responsibilities are documented and understood at the RMC level and within the risk department, but definition of roles, responsibilities and authorities at the BOD level may not be clearly articulated nor formally documented. F	There is a defined organization structure in place where authority and responsibility is formally delegated from the highest level of the organization (BOD or their delegate) to the Risk Management Committee and then to the Risk Control Department. There is a Sr. Executive Level Risk Control Officer, who typically chairs the RMC, who reports to the BOD as well as the CEO. The CRO role has the ability to compel change within the organization. The RMC is robust, effective, and forward-looking. Formal roles and responsibilities are documented and understood for all levels in the risk management hierarchy.
1.1.2 - BOD Oversight	The Board of Directors or their delegate provides tacit oversight of the enterprise's risk management activities. The Board of Directors or their delegate may receive periodic risk management reports that are reviewed at periodic meetings. C	Detailed Board of Director responsibilities have been formalized through the authorization of a risk management charter, which details the role of the board and the risk management committee or their respective delegates. The Board of Directors or their delegate receives periodic risk management reports that are reviewed at quarterly/monthly meetings. F	The Board of Directors, or their formal delegate, has the capability to understand the company's risk management objectives, risk tolerance, and overall risk management framework, determine appropriate BOD level reporting requirements, and conduct ongoing formal communications with management. The Board of Directors (or their delegate) should be assigned authority to perform the following responsibilities: 1) Approval of Transacting Mandate; 2) Approval of Corporate Limit Structures; 3) Understanding and Advising on Risk Measurement Guidelines; 4) Understanding Authority Limits assigned to management; 5) Understanding Risk Management Policies; and 6) Understanding Credit Management Policies.

	Developing	Prevalent	Leading
1.1.3 - Risk Management Committee	The Risk Management Committee may exist, but there is still no effort to manage risk across the corporation. There is likely not a Risk Committee Charter. The RMC likely consists of a Chief Financial Officer and senior management of the trading organization, and there is no formal reporting relationship to the Board of Directors. Informal guidelines required for risk management control infrastructure, including implementation and monitoring of compliance with the company’s risk policy, are developed outside of the RMC. Meetings are generally reactionary in nature, and frequently focus on the market or what has happened instead of managing risk. Meetings are informal. Quorum and voting procedures are only loosely defined, if defined at all. C	The Risk Management Committee delegates responsibility for developing risk policies and overseeing the management of risk to the Risk Control function. It reports informally to the Board of Directors. There may or may not be a formal Risk Committee Charter. The RMC composition will vary depending on the size of the company and the complexity of its transacting activities. The RMC includes, at a minimum, the Chief Risk Officer ("CRO") (or, absent a CRO, the Independent Risk Manager), Chief Financial Officer ("CFO"), and senior management of the trading organization. Formal guidelines required for an appropriate risk management control infrastructure, including implementation and monitoring of compliance with the company’s risk policy, are developed by the RMC. The RMC meets periodically (usually monthly). There is normally a set schedule and meeting agenda of required topics. Quorum and voting procedures are loosely defined in the committee charter. Meeting notes are taken and distributed, but there is not necessarily a formal process.	The Risk Management Committee ("RMC") is granted its authority from a Risk Committee Charter and is responsible for developing and approving risk policies and overseeing the management of risk. It serves as the highest level of corporate risk management and directly reports to the Board of Directors. The RMC composition will vary depending on the size of the company and the complexity of its transacting activities. The RMC includes, at a minimum, the Chief Risk Officer (CRO) (or, absent a CRO, the Independent Risk Manager), Chief Financial Officer (CFO), and senior management of the trading organization. Other representatives, such as Legal, Credit and Internal Audit, may also participate in meetings but usually do not vote as a member of the RMC. The RMC develops formal guidelines required for an appropriate risk management control infrastructure; this includes implementation and monitoring of compliance with the company’s risk policy, as well as providing guidance in strategic decisions involving risk, including delegation of authorities. The RMC meets periodically (usually bi-weekly or monthly), as appropriate for the level of transacting activity. These meetings have a formal structure, a set schedule, and a set meeting agenda of required topics. Quorum and voting procedures are defined in the committee charter. Minutes are recorded which include documentation of decisions, pending issues, and actions taken. F
1.1.4 - Segregation of Duties	Front and back office functions are delineated, however, the middle office function is performed by a variety of personnel from the front and back office with no true middle office function in place. The Front Office is responsible for initiating all commodity marketing and transacting activities. There is usually only limited segregation of duties between the front-office and the risk management / risk control (i.e., Middle Office) and Back Office functions with an inordinate amount of reliance on front-office personnel in these various areas. Front office personnel are responsible for managing the company’s market risks and likely have a limited or basic understanding of risk and reward, operations, planning and risk management.	Front, middle and back office functions are delineated, and the middle office function is performed by independent personnel. The Front Office is responsible for initiating all commodity marketing and transacting activities. It is organizationally and functionally independent of the risk management and risk control (i.e., Middle Office) and Back Office functions. The Middle Office measures, monitors, controls and reports market risks associated with the organization’s commodity transacting activities. The Middle Office is organizationally and functionally independent from the Front and Back Office operations. Policies, processes, procedures, segregation and roles and responsibilities are likely either formally documented, or at least well understood if not formally documented.	Segregation of duties between front, middle, and back office personnel is documented in commodity transacting procedures manuals and is followed by the organization. The Front Office is responsible for initiating all commodity marketing and transacting activities. It is organizationally and functionally independent of the risk management and risk control (i.e., Middle Office) and Back Office functions. All risk oversight, validation, reconciliation and accounting functions are independent of Front Office decision-making in both form (reporting lines) and substance (incentives). Even though front, middle and back office functions are segregated, they work together to provide the most comprehensive utilization of risk management activities to leverage the skills within each functional organization.

	Developing	Prevalent	Leading
	Policies, processes, procedures, segregation and roles and responsibilities are probably functioning in some manner, but may not be formally documented.	 	Policies, processes and procedures are formally documented.
1.2.1 - RMP Policy and Administration	Risk Management Policies consider the following points: 1) Transacting Philosophy; 2) Organizational/Governance Structure; 3) Segregation of Duties; 4) Risk Identification; 5) Limit Setting Authorities. To the extent that as Risk Management Policy exists, the content is limited to high level areas such as a description of permitted activities, high level limits, types of risk measured and high level organization charts. The detailed market and credit risk limits may exist, but are likely not formally established within the RMP. A formal or informal process may be in place for all employees who are involved in the transacting functions (front-office) to sign a form annually, stating that they have read, understand, and agree with the principles and practices contained in the Policy. Middle and back-office personnel are not required to acknowledge or sign the policy. 	Risk Management Policies consider the following points: 1) Transacting Philosophy; 2) Organizational/Governance Structure; 3) Roles and Responsibilities; 4) Segregation of Duties; 5) Risk Identification; 6) Market Risk Measures; 7) Credit Risk Measures (possibly by reference to Credit Policy); 8) Limit Setting Authorities; 9) Limit Violation Repercussions; 10) Policy Revisions Process / Timing; 11) Acknowledgment. Detailed market and credit risk limits are formally established within the RMP. 	The Risk Management Policy ("RMP"), approved by the BOD, exists either on its own or as part of a suite of documents established by the company to provide effective risk oversight and monitoring. The RMP provides entity level detailed guidance and controls and also serves to define corporate transacting and credit risk tolerances. In aggregate, these documents codify certain approved control policies, provide evidence of entity level risk oversight, and seek to reduce the likelihood that transacting activities will expose the company to risks that exceed defined tolerances. This also reduces the likelihood that unforeseen risks are incurred or left unmanaged. Risk Management Policies consider the following points: 1) Transacting Philosophy; 2) Organizational/Governance Structure; 3) Roles and Responsibilities; 4) Segregation of Duties; 5) Risk Identification; 6) Market Risk Measures; 7) Credit Risk Measures (possibly by reference to Credit Policy); 8) Limit Setting Authorities; 9) Limit Violation Repercussions; 10) Policy Revisions Process / Timing; 11) Acknowledgment.
1.2.2 - Policy Updates	RMP and Procedures documentation is often maintained in a centralized location but there may not be formal responsibility for managing and periodically updating the documentation. Updates are performed in an informal manner and are often reactive in nature to outside forces or events / issues. Only significant modifications to the risk management policies are discussed and approved by the Risk Management Committee. There is seldom, if ever, independent review or assessment of the Policy for formal updates. 	RMP and Procedures documentation is maintained in a centralized location with the formal responsibility for managing and periodically updating the documentation being performed as the independent risk group. Overrides of the risk management policies are nearly always discussed and approved by the Risk Management Committee. Upon occurrences of major issues, independent review of the policy may be performed. Risk Management Policies and Procedures are documented and approved by the Risk Management Committee at the time that they are initially developed. The Policies and Procedures are periodically reviewed and amended, but may not necessarily be approved on a set schedule by the RMC. The RMP is formally approved as significant changes occur.	Leading practice is to have one comprehensive policy that governs all commodities and instruments. All RMP and Procedures documentation is retained in a centralized location and is accessible by the appropriate functions within the organization. Responsibility for managing and periodically updating the documentation has been formally assigned, typically to an independent risk management function. Any overrides of the risk management policies (including those relative to derivative classification) require proper authorization and are subsequently independently reviewed. Independent reviews of the Policy are performed on a regularly scheduled periodic timeframe (3-5 years). 

	Developing	Prevalent	Leading
1.3.1 - Objective-setting and Hedge Strategy Design	The hedge program's objectives are not fully articulated. The objectives may be vague or unquantifiable. The organization's hedge strategy is only loosely defined. There are no analytics to support the hedge strategy and there is no clear link between the hedge decisions being made and the achievement of the programs objectives. C	The hedge program has objectives that are clear and quantifiable; however, the hedge strategy development is largely focused on derivative instruments types and the how a particular instrument performs when prices rise or fall. There is no link between the hedge decisions being made and the achievement of the programs objectives.	The hedge program has objectives that are clear, quantifiable, and market compatible. The hedge strategy is developed by testing how different combinations of hedge decisions support (or don't) the achievement of the programs objectives. Through the simulation process, it can be determined whether the hedge strategy execution over time, and regardless of market conditions, deploys the types of risk mitigating actions that should be deployed to prevent the realization of intolerable outcomes as defined by the program's objectives. F
1.3.2 - Risk Profiling and Hedge Strategy Analysis	Risk profiling, the qualitative and quantitative modelling of the company's natural risk and exposure to underlying market price and volumetric uncertainty, is performed regularly (every few years) but does not set the foundation for establishing risk tolerances or hedge strategies consistent with corporate objectives. C	Risk profiling, the qualitative and quantitative modelling of the company's natural risk and exposure to underlying market price and volumetric uncertainty, is performed annually and is analyzed as the foundation for establishing risk tolerances or hedge strategies consistent with corporate objectives. Hedge simulation analysis is incorporated in order to evaluate the performance of potential hedge program structures in the context of improving the risk profile. These analyses are typically performed through manually intensive processes.	Risk profiling, the qualitative and quantitative modelling of the company's natural risk and exposure to underlying market price and volumetric uncertainty, is performed annually and is analyzed as the foundation for establishing risk tolerances or hedge strategies consistent with corporate objectives. Hedge simulation analysis is incorporated in order to evaluate the performance of potential hedge program structures in the context of improving the risk profile. These analyses are typically performed through automated technology solutions with the simulation analysis and output reviewed by the risk manager each year. Risk identification processes are fully integrated and highly technology enabled: Pro-active notification of key changes in the internal or external environment; risk checklists and repositories are defined (per risk category) and clearly understood by all stakeholders. Feedback from Business Planning is incorporated. F
1.3.3 - Risk Appetite	Elements of risk appetite are defined in relevant risk policies for some risk types in some business units. The risk appetite and tolerance vary from exposure to exposure. There may be some understanding of the overall risk appetite at the management level, but this is not articulated into specific tolerance levels which can be allocated or communicated across the business units. Some risk measures and limits may or may not be documented. However, they are broad and have minimal impact on decision making.	Risk appetite is explicitly defined at an overall level for the enterprise. Risk measures and limits are linked to the goals of the enterprise and the expectations of the Board and other stakeholders. The enterprise has clearly documented risk measures and limits and standards for risk taking that are widely understood throughout the enterprise. Conformance with risk appetite is a key criterion in the assessment of new businesses and products.	Risk measures and limits are set at the enterprise level and are allocated across business units. Risk appetite forms an integral part of overall strategy and is reviewed at regular intervals. Increased sophistication is present in the use of quantitative and qualitative criteria to assess performance against appetite levels. Risk exposures are calculated frequently and hierarchically within the organizational structure. Limits and standards are communicated across business units and their usage is widely embedded in day-to-day business activities. Risk appetite forms an integral component of the enterprise's strategic objectives and plans. An aggregate risk measure has been adopted and is used to guide decision-making. Risk appetite is formulated on an integrated risk basis using quantitative and qualitative methods that allow for timely

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1.3.4 - Risk Limits	C	F	recalibration of limits as business conditions change. Risk limits are allocated to optimize risk-adjusted return hierarchically within the enterprise down to the product level where appropriate. There is clear understanding of the value drivers that influence risk appetite.
	Risk limits are either informally or loosely documented in either the RMP or procedure manuals, which may be subject to change and communicated via ad hoc or informal measures. Risk limits have been set by the transacting organization, but they are disconnected from corporate risk tolerances. C	Risk limits are documented in both corporate policy and procedure manuals. The RMC has responsibility for reviewing and approving portfolio limit structures and trading authorities within the parameters of the limits established by the Board. Approvals of portfolio limits and trading authorities are clearly documented and readily available for review, when necessary. Some organizations use a two-tier limit structure that differentiates between absolute and caution limits. Caution limits require discussions, tentative corrective actions, documentation of outstanding exposures and possibly an ad-hoc meeting of the RMC. Caution limits are considered to be exposure monitoring tools that are utilized to determine whether exposures should be held at current levels, increased or decreased. Limits are periodically adjusted in order to respond to changes in market conditions. There is a one time acknowledgement of the understanding of the limits by line personnel. F	The RMC has responsibility for reviewing and approving portfolio limit structures and trading authorities within the parameters of the limits established by the Board. Approvals of portfolio limits and trading authorities are clearly documented and readily available for review, when necessary. Some organizations use a two-tier limit structure that differentiates between absolute and caution limits. Caution limits require discussions, tentative corrective actions, documentation of outstanding exposures and possibly an ad-hoc meeting of the RMC. Caution limits are considered to be exposure monitoring tools that are utilized to determine whether exposures should be held at current levels, increased or decreased. Detailed limits are allocated to transacting activities in order to optimize the allocation of capital to transacting activities that yield the best risk/return relationship (high returns/low risk). Limits are actively adjusted in order to continuously respond to changes in market conditions that yield the best risk adjusted returns. The RMC has primary responsibility for the market risk limit setting process, including disaggregating limits where appropriate by strategy or source of risk. The RMC also actively monitors the limits and ensures that they are communicated to line management.

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1.3.5 - Book Structure	Book structures are defined and implemented upon implementation of a trading and risk management system. While a book structure is designed and in place, this structure is often not granular enough for detailed management reporting, accounting requirements and risk monitoring purposes. The book structure also tends to be inconsistent across business units and products. Book structure definition and documentation is not detailed and is reviewed and updated only on an inconsistent or sporadic basis. Personnel assigned to evaluate and verify book structure designation often do not have the proper knowledge and training to perform such activities. C	Book structures are defined and implemented within the trading and risk management system. The structure is granular enough for high level management reporting, accounting requirements and risk monitoring purposes. The book structure also may be inconsistent across business units and products. Book structure definition and documentation is not detailed and is reviewed and updated on an "as-needed" basis when business strategies or requirements change. Personnel assigned to verify and evaluate book structures have received no formal training and are qualified to do so. The book structure is defined and documented based on the purpose of the transaction (speculative, hedge, spot, forward, asset, arbitrage, etc.). All books are defined and documented with the structure being re-evaluated on a pre-defined scheduled basis to ensure that current books reflect the strategy and operations of the organization. F	Procedures exist and are documented that ensure all transactions are properly designated according to the "book structure." The book structure reflects the current strategy and operations of the business and is reviewed and updated on a regularly scheduled basis. Portfolios are established that enable management to monitor exposures related to different transacting activities and attributes. This allows management to employ different limit structures that are consistent with management's appetite for the respective transacting activity. For large organizations with multiple transacting functions, portfolio structures are consistently applied to ensure that exposures and related limits roll up into the appropriate categories. The book structure is defined in the RMP and approved by the RMC and management reporting is performed in a consistent manner with the entity's risk management policies. Processes and procedures for developing and revising the book structure are well defined and documented. All personnel responsible for deal execution and validation are aware and knowledgeable of the book structure format and definition.
1.4.1 - Delegation of Authority	Risk authority is effectively delegated at the business unit level, but authorities are still are not fit for the current business model. Lack of data integrity frequently hinders reporting current positions and exposures in relation to authorities. Knowledge of authorities is rudimentary. Desks focused on financial trading are more likely than physical desks to understand and use authorities as a management tool. Excessions of authority are still managed reactively, but there are processes in place to do so. C	Delegations of authority are fit for the current business model. Risk is effectively distributed at the business unit level, likely based on "what is needed." Some desks/regions use delegations more proactively than others as a way to properly allocate risk tolerance. There is basic documentation and understanding of authorities amongst those responsible for managing within those authorities. Excessions of authority are generally planned for proactively, and there may be an ad hoc process in place for lending delegation if / when needed. F	Delegations of authority are fit for the current business model and risk is effectively distributed across the business so as to enact overall business strategy. Authorities are understood. There is strong documentation of authorities and in-depth knowledge and understanding of authorities. An ability exists for these authorities to be driven by periodic or ad hoc based market dynamics. There is a specific documented method / process for transferring or "lending" authority from one group to another or from higher management levels as large "out of authority" transactions are executed, or as limits are approached. When authorities are breached without having been proactively anticipated, defined processes are in place to determine the cause and magnitude of the breach and specific steps are undertaken to address the situation. A formal process is in place that guides how DOA is measured/arrived at.

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2.1.1 - Knowledge Sharing	Organization communicates with other companies and trade groups in its own industry, using them to compare performance. Interaction with functional experts in Front, Middle and Back Office is developing. Groups within the organization begin sharing "lessons learned". Knowledge sharing from other functions in the organization is developing.	Organization communicates with other companies and trade groups in its own industry, using them to compare performance. External benchmarking studies may be performed infrequently. Organization participates in and encourages personnel to attain certification(s) from recognized industry groups. Front, Middle and Back Office experts are consulted and valued in managing assets. Groups within the organization occasionally share "lessons learned" (meetings, email, etc.). Knowledge from other functions are shared on key activities.	Organization communicates with companies/groups across industries and is willing to share ideas and capitalize on improvement opportunities. "Centers of Competency" are used as a mechanism for the capture, storage and exchange of knowledge. External benchmarking studies are performed periodically. Front, Middle and Back Office experts are regularly consulted and valued in managing assets. Groups within the organization actively sharing "lessons learned" (Leading Practice Networks, etc.). Knowledge from other functions are shared on both routine and key activities.
2.2.1 - Roles and Responsibilities	Roles and responsibilities are loosely defined or understood, but are not formally defined and documented. Informal roles and responsibilities are included in specific job descriptions and these are documented, but often change. Reporting hierarchies are understood and informally defined. Specific accountabilities within the group are only generally understood.	Reporting hierarchies are formally defined and documented. Formal roles and responsibilities for the department and specific job functions are documented in risk policies, processes and procedures and within job descriptions. Accountabilities within the group are understood but may not be completely articulated.	Roles and responsibilities are formally documented. Personnel are highly cross-trained with the requisite skills and capabilities to assist when required. Accountabilities within the group and outside of the group are well understood and formally articulated.
2.3.1 - Adequacy of Resources	Specific executive(s) are assigned to lead the risk control group, but individuals are often not risk specialists. Risk resources are minimally adequate to carry out routine responsibilities, such as daily position and P&L reporting, limit monitoring, etc. Risk resources are often "overwhelmed" by their front-office counterparts and are unwilling or unable to challenge results or outcomes. Little time or attention is devoted to in-depth analysis or value adding risk analysis work. Tools and methodologies are being developed to make risk control able to provide more valuable services.	Executive(s) with market and credit risk knowledge and authority manage the risk control group. Risk control group is properly funded and resourced to handle routine and discretionary risk responsibilities. Key personnel in the risk group are "risk professionals" who have decided on risk control as a career. These personnel have experience and knowledge to "stand up" to front-office personnel when discrepancies or issues occur. Tools and methodologies are well developed to make risk control able to provide more valuable services.	Risk group is well funded and adequately resourced to efficiently handle routine and non-routine responsibilities. The CRO has the ability and budget to manage staffing and resources to accommodate changes to risk requirements and are regularly evaluated against external benchmarks. The risk organization is periodically subject to independent third-party reviews for effectiveness. Tools and methodologies are state of the art allowing risk control to provide highly valuable analysis services. Risk control is considered a key differentiator in the organization as to how the organization approaches and manages risk.

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2.4.1 - Risk Department Structure	A risk control department exists but is not functionally separate or is overly influenced by the trading function. As the organization progresses, risk control (middle office) department falls within the finance or treasury department. It may report to a level below senior management and may lack high level visibility in the organization.	The risk control (middle office) department reports to a member of senior management such as the General Manager. Risk Control is organizationally and functionally separate from the trading function.	The risk control (middle office) department reports the Chief Risk Officer (CRO) who in turn reports to the General Manager and Board of Directors.
3.1.1 - Communication	Planning develops requirements for products to solicit based on forecasting and valuation methodologies formalized within the department. Planning and Analysis group sends via email informal communication methods, Procurement an estimate of procurement requirements. The estimate includes volumetric requirements, pricing forecasts, analysis or related resources available to ensure the optimal use of resources.	Planning develops requirements for products to solicit based on forecasting methodologies approved and formalized by the Risk Management Committee. Planning and Analysis (or similar group) group sends email formally communicating procurement requirements to the appropriate individuals. The estimate includes volumetric requirements, sometimes pricing forecasts, and analysis or related resources available to ensure the optimal procurement of resources.	Planning develops requirements for products to solicit based on forecasting and valuation methodologies approved and formalized by the Risk Management Committee (or subcommittee). The methodologies are well documented and maintained. Planning and Analysis group utilizes analytic and online reporting functionality in the system of record to provide Procurement estimates volumetric requirements, pricing forecasts, analysis or related resources available to ensure the optimal use of resources.
3.2.2 - Master Agreements	Master agreements tend to be negotiated by front-office or senior management personnel. However, prior to the execution of any transaction with a new counterparty, both Legal and Credit approval is required. Legal is responsible for reviewing and approving all master agreements and standard enabling contracts and maintains originals of all executed agreements. Approvals (Legal, Credit, Front Office, Accounting) are not formally tracked in an approval form.	Prior to the execution of any transaction with a new counterparty, both Legal and Credit approval is required. Legal is responsible for reviewing and approving all master agreements and standard enabling contracts and maintains originals of all executed agreements. Approvals (Legal, credit, Front Office, Finance) are formally tracked in an approval form.	Prior to the execution of any transaction with a new counterparty, both Legal and Credit approval is required. Legal is responsible for reviewing and approving all master agreements and standard enabling contracts. Contracts Management or another relevant group is responsible for archiving agreements. Approvals (Legal, Credit, Front Office, Accounting) are formally tracked in an approval form.
3.2.3 - New Products	For transacting activities, products, commodities or strategic investments that are considered significantly different from historical activities, Front Office will often communicate with Middle and Back Office regarding the impact of the prospective transacting activities. However, profit is still the number one factor and will normally override any concerns of the middle or back office. The Risk Management and Finance functions may assist the front office in understanding the impact of the new transacting activity. RMC notification (but not necessarily approval) of significant new transacting activities or strategies is required prior to deal execution.	For transacting activities, products, commodities or strategic investments that are considered significantly different from historical activities, Front Office will notify Middle and Back Office of the prospective transacting activities in order to consider the impact of the new activity. The Risk Management and Finance functions assist the RMC in understanding the impact of the new transacting activity. RMC approval of new transacting activities or strategies is required prior to deal execution.	For transacting activities, products, commodities or strategic investments that are considered significantly different from historical activities, Front Office will notify Middle and Back Office of the prospective transacting activities in order to consider the impact of the new activity (see definitions in next section "Organization Structure"). The Risk Management and Finance functions assist the RMC in understanding the impact of the new transacting activity. The Board of Directors understands all significant strategic activities and inherent risks. RMC approval of new transacting activities or strategies is required prior to deal execution. The treatment of standard versus non-standard product types has been differentiated in these practices, where non-standard products are subject to more frequent review and approval.

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3.3.1 - Tactical Meetings	Less than daily discussions are held by transacting personnel to recap the transacting activities since the last meeting, evaluate positions by trader and/or market location, discuss relevant operational and market events and discuss market views. These meetings are often led by the head trader with front office senior management only attending periodically. New tactical decisions and products are presented and discussed by the Risk Management or Trading Committee in a separate forum.	Daily discussions are held by transacting personnel to recap the transacting activities from the prior day, evaluate positions by trader and/or market location, discuss relevant operational and market events and discuss market views. These meetings are often led by the head trader with front office senior management regularly attending. New Tactical decisions and products are often presented and explained once they have been discussed by the Risk Management Committee C F	A formal daily tactical meeting is attended by transacting personnel to formulate transacting strategies before the markets open. Both short and long-term market forecasts are discussed (including the output of forecasting models), positions are reviewed, physical requirements (e.g., scheduling, nominations, and transportation) are determined, and daily trading activities are proposed. The Front Office senior management is responsible to ensure that transacting activities proposed are consistent with the firm's strategic business and operational objectives and corporate risk tolerances. Counterparties that are near their credit limits are identified, as are any desks approaching their VaR limits. The daily tactical meeting is also used as an opportunity to initiate front office discussions on recommendations for new trading products, and to assess the existing infrastructure's capabilities to effectively manage product risks.
3.3.2 - Trade Analysis and Comparison Against Limits	Before any transactions are executed, traders verify counterparty status, transaction compliance with market and credit risk limits, product authorization and enabling contract status. Traders have access to reporting where credit and market risk exposures are either monitored in an after-the-fact and reactive manner or updated/compared to established risk limits periodically, as are updated product approval lists. Not all Risk and Credit limits are documented in the appropriate Risk Management and Credit Policies.	Before any transactions are executed, traders verify counterparty status, transaction compliance with market and credit risk limits, product authorization and enabling contract status. Traders have access to reporting where credit and market risk exposures are updated and compared to established risk limits daily, as are updated product approval lists. The system of record maintains the functionality for traders to enter "pending trades" in the system in order to evaluate the impact to portfolio risk metrics and hedge program compliance prior to trade execution. Risk and Credit limits are established and documented in the appropriate Risk Management and Credit Policies. C F	Before any transactions are executed, traders verify counterparty status, transaction compliance with market and credit risk limits, product authorization and enabling contract status. Traders have access to reporting where credit and market risk exposures are updated and compared to established risk limits in real time, as are updated product approval lists. The system of record maintains the functionality for traders to enter "pending trades" in the system in order to evaluate the impact to portfolio risk metrics and hedge program compliance prior to trade execution. Front office personnel are also able to perform stress-test scenarios on the portfolio valuations and risk metrics by modifying key parameters such as current forward market prices, volatilities, correlations, and load forecasts. Scenarios may be saved and re-run in future automated reports.

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			Risk and Credit limits are established and documented in the appropriate Risk Management and Credit Policies.
3.4.1 - Position Reporting	Front Office personnel often maintain personal spreadsheets that track outstanding position. Middle Office personnel are responsible for calculating and reporting positions from the trading system of record on a ad-hoc or periodic basis (weekly or monthly). Deals may or may not be entered into the system in a timely and/or accurate manner. Prior to distribution of position reports, Middle Office personnel review positions for reasonableness. Front Office personnel often maintain personal spreadsheets that track outstanding positions. Upon receiving position reports, Front Office discards them or does not acknowledge the report as complete or accurate. There is limited documentation of assumptions, processes and procedures associated with the calculation and reporting of positions.	Middle Office personnel are responsible for calculating and reporting positions from the trading system of record on a daily basis. Prior to distribution of position reports, Middle Office personnel review positions for completeness and accuracy. Ideally, Front Office personnel will not maintain personal spreadsheets that track outstanding position since the information in the system is reliable. Upon receiving position reports, Front Office will review Middle Office positions reports for completeness and accuracy and notify the middle-office of any discrepancies. Documentation of assumptions, processes and procedures associated with the calculation and reporting of positions is strong. C F	Middle Office personnel are responsible for calculating and reporting positions from the trading system of record on a daily basis (potentially available on real-time intra-day basis). Prior to distribution of position reports, Middle Office personnel review positions for completeness and accuracy. Ideally, Front Office personnel will not maintain personal spreadsheets that track outstanding position since the information in the system is reliable. Upon receiving position reports, Front Office will review Middle Office positions reports for completeness and accuracy and notify the middle-office of any discrepancies. For senior management monitoring purposes, positions may be aggregated according to reasonable proxy commodity locations and time buckets, which are highly correlated. If positions are aggregated, Middle Office documents its assumptions (e.g. correlations) for combining any positions. Technology enhancements allow many leading companies to manage and monitor real-time positions. Documentation of assumptions, processes and procedures associated with the calculation and reporting of positions is strong.
3.4.2 - Mark-to-Market Process	MTM and P&L amounts are calculated frequently and reported by an independent Middle Office function by relying on manual processes and excel spreadsheets for MTM calculations. The MTM and/or P&L reports are available on a less than daily basis (weekly, bi-weekly, or monthly). Front Office personnel also maintain personal spreadsheets that track MTM and P/L. Upon receiving MTM reports, Front Office reviews the MTM or P&L reports generated by the middle office for reasonableness.	MTM and P&L amounts are calculated daily and reported by an independent Middle Office function utilizing a system designated as the official books and records for MTM calculations. Management and front-office personnel place reliance on the information generated from the system. The daily MTM and/or P&L reports are available to all interested parties, while senior management receive weekly or monthly reports. Front Office personnel may also maintain personal spreadsheets that track MTM and P/L. Upon receiving MTM reports, Front Office reviews the MTM or P&L reports generated by the middle office for	MTM and P&L amounts are calculated at least daily (intra-day MTM reporting may be available) and reported by an independent Middle Office function utilizing a system designated as the official books and records for MTM calculations. Management and front-office personnel place reliance on the information generated from the system. Daily MTM and P&L reports as well as explanations of daily changes in MTM amounts are required to be presented in daily reporting to senior management. Ideally, Front Office personnel do not maintain personal

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	Mark-to-market reporting is primarily manual in nature with limited basic query and "drill-down" ability. There is limited documentation in place for the mark-to-market or P&L reporting processes. C	reasonableness. There is general acknowledgement that the P/L is reasonably accurate and differences can be documented and/or explained. Mark-to-market reporting is primarily automated with some manual adjustments utilized for formatting and reporting purposes. There is basic query and "drill-down" ability within the system of record. There is basic documentation in place for processes and procedures. F	spreadsheets that track P/L and MTM since the information in the system is reliable. Upon receiving reports, Front Office will review Middle Office the mid-office reports for completeness and accuracy and notify the middle-office of any discrepancies. Financial reporting personnel receive daily MTM and/or P&L reports published by Middle Office in order to better understand P&L changes recorded to financial records. Mark-to-market and P/L reporting is completely automated with pre-formatted reports being generated every night. There is robust query and "drill-down" ability within the system of record. There is robust documentation in place which is subject to regular reviews and updates.
3.4.3 - Market Data Sourcing	Front Office personnel sourcing market data with limited input from the Middle Office. This includes the sourcing of not regularly used market data. Middle Office is responsible for independent verification and approval of market data source but this does not often occur prior to transacting and is more of a valuation function after the fact. There is limited use of independent quantitative experts to assess the reasonableness of amounts reported. C	Front Office personnel participate with the Middle Office in sourcing market data. This may include the sourcing of no regularly used market data sources. Middle Office is responsible for independent verification and approval of market data sources which occurs prior to transacting. There is periodic use of independent quantitative experts to assess the reasonableness of amounts reported. F	Front Office personnel participate in sourcing market data with the Middle Office. All transactions are valued within the trading system of record. Middle Office is responsible for independent verification and approval of market data sources. For long-term or high value transactions, Middle Office is responsible for independent verification and approval of market data s prior to transacting. Regularly, the organization employs quantitative experts to assess the reasonableness of amounts reported. There are periodic reviews of data sources by independent third parties.
3.4.4 - Limit Reporting and Monitoring	Market risk limit excessions are identified and self-reported by front-office personnel. Due to lack of confidence in data or tools/infrastructure, these limits and potential violations are not always taken seriously. Resolution decisions and steps are not consistently documented or tracked. Market risk limits are monitored on a regularly scheduled basis that is less than daily. Limit monitoring reports are relatively informal and often only distributed on an weekly or monthly basis.	Management uses a comprehensive set of reports that cover limits, margins, contracts, and infrastructure. Large risk reporting, and not just large exposure reporting, is examined regularly. Limit excesses may result in an ad-hoc RMC meeting being called. The RMC is presented with the corrective action by the Front Office and votes on whether limits will be increased or the corrective action to be taken, which result in exposures being mitigated to within approved tolerances. The Independent Risk Manager participates in the RMC meetings and assists other members of the RMC in understanding the issues and related impacts of corrective actions. When exposures exceed the limit, transacting in that book is halted, except for transactions that reduce the exposure, and that have been approved by the RMC. Market risk limits (VaR, P/L, Position, Options, etc.) are updated based on prior day's closing data, and made available to traders each morning, prior to market openings. Prior to execution of transactions, traders verify transaction compliance with market risk limits, and product authorization. Any transaction that would exceed pre-approved risk limits must be approved by a function independent of the transacting function. In addition, if information	Limit and violation reporting is an automated process where the system generates violation reports that are automatically distributed to a pre-defined set of recipients. Based on the severity of the violation, members of Risk Control, Front-Office Management and/or Senior Management may receive notification. Limit excesses (defined above a specific threshold) require that RMC meetings be called. The RMC is presented with the corrective action by the Front Office and votes on whether limits will be increased or corrective action enforced, which result in exposures being mitigated to within approved tolerances. The Independent Risk Manager participates in the RMC meetings and assists other members of the RMC in understanding the issues and related impacts of corrective actions. When exposures exceed the limit, transacting in that book is halted, except for transactions that reduce the exposure, and that have been approved by the RMC. Independent Risk Management (including credit) may call impromptu RMC meetings if limits are being approached.

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			Front Office will work through Independent Risk Management to highlight growing exposures due to market conditions or new strategies. The RMC considers the performance of the transacting activity and determines how exposures and limits should be managed. Corrective actions are subject to a RMC vote. A function independent of the transacting function reviews exposure and market risk limit (VaR, P/L, Position, Options, etc.) reports for traders (or marketers) on a real-time basis. Discrepancies and/or items beyond established limits are investigated and resolved. Before any transactions are executed, traders verify transaction compliance with market risk limits and product authorization status. Market risk limits are updated in real time through and are readily available to the traders, as are updated product approval lists.
3.4.5 - Management Reporting Format and	Integrated management reports are prepared for all risk types across all business units at regular predefined intervals such as monthly. Predefined reports are prepared for the Risk Management Committee (RMC) monthly and the Board quarterly. There is an established understanding of the format and frequency of distribution of risk reports to the RMC and appropriate line management that include: P/L Reports (Realized/Unrealized), Position Reports, Limit Utilization, Exception Reports, and Credit Exposure Reports. The reports are prepared by an independent risk management function, or the middle office. Actions to address issues included in the report are not defined. 	There is consistent reporting of objectives, targets, performance and risks across the enterprise. There is an established understanding of the format and frequency of distribution of risk reports to the RMC and appropriate line management that include: P/L Reports (Realized/Unrealized), Position Reports, Limit Utilization, Exception Reports, and Credit Exposure Reports. The reports are prepared by an independent risk management function, or the middle office. Actions to address issues included in the report are defined. 	The RMC has established the format and frequency of distribution of risk reports to the RMC and appropriate line management that include: P/L Reports (Realized/Unrealized), Position Reports, Limit Utilization, Exception Reports, and Credit Exposure Reports. The reports are prepared by an independent risk management function, or the middle office. These reports are distinctly tied to their specific strategies or "value buckets." "What if" scenarios are reported.
3.4.6 - At-Risk Measures	There is no consistent use of "At-Risk" measures such as VaR to monitor trading activity, and when they are used, it is often done so inappropriately. The frequency of "at-risk" calculations may be performed on an ad hoc or monthly basis by front office personnel. The VaR methodology and purpose is not necessarily well understood throughout the organization. No other "At-risk" methodologies are used. Often, one specific desk (or perhaps business unit) can calculate specific "at-risk" measures (usually a financial desk) and this is used as a model for other desks. There is limited documentation of the assumptions, methodologies, processes and procedures around the "at-risk" calculations.	"At-Risk" measures such as VaR are used to monitor all trading activity in an appropriate and effective manner. The frequency of "at-risk" calculations may be performed on a weekly basis by front or middle office personnel. The VaR methodology and purpose is well understood throughout the organization. Transacting activities may also be monitored using at least one other "At-Risk" measure such as Gross-Margin-at-Risk ("GMar"), Earnings-at-Risk ("EaR") or Cash Flow-at-Risk ("CFaR") measures. There is some documentation of the assumptions, methodologies, processes and procedures around the "at-risk" calculations; however, systems and processes across the organization may not operate well enough to allow for the preparation of consistent, usable and well-understood at-risk reports on a company-wide basis.	VaR and other "at-risk" measures are calculated by an independent middle office function on a daily basis and are understood throughout the organization. The measures are periodically validated by an independent 3rd party (external consultant, internal audit, external auditors). Valuation and market risk measurement methodologies utilize the same market data in calculations. Companies that employ valuation and market risk measurement calculations across disparate systems ensure such systems are integrated and market data and other data are consistently applied. Technology capabilities enable Middle Office to drill down to sub portfolios and other transaction attributes (e.g. VaR by commodity location, period, trader, strategy, etc.) in order to better understand sources of VaR. Given the volume and

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	C	F	complexity of transacting activities, VaR is subject to back testing procedures more frequently (e.g. daily, weekly or monthly). Cash flow-at-risk (CFaR) or similar metrics such as Gross Margin-at-Risk (GMaR) or Earnings-at-Risk (EaR) are employed to measure potential risks associated with business and transacting activities that have an earnings expectation. These metrics may be used as a substitute for VaR-based metrics. Management reports should provide a clear definition of its risk metric, to accompany risk reports.
3.5.1 - Scenario Analyses	Sensitivity analysis is sometimes used to consider events and scenarios that are not considered in standard VaR calculations. Stress testing is employed periodically (annual or less) to determine whether the model(s) are still performing as intended. Methodologies for measuring and reporting stress tests and scenario analysis are inconsistent across the organization and various business units.	Sensitivity analysis is periodically used to consider events and scenarios that are not considered in standard VaR calculations. Periodic stress testing is conducted along political, economic, financial, forward market, operational, regulatory, counterparty and up-mid-downstream event scenarios. Methodologies for measuring and reporting stress tests and scenario analysis related to scenarios and events that are consistent concerns are periodically employed.	Sensitivity analysis is required and is used to consider events and scenarios that are not considered in standard VaR calculations. Extensive stress testing is conducted along political, economic, financial, forward market, operational, regulatory, counterparty and up-mid-downstream event scenarios. Methodologies for measuring and reporting stress tests and scenario analysis related to scenarios and events that are consistent concerns are required and regularly employed. Additionally, other scenarios and events may be identified and considered on an ad-hoc basis for measurement and reporting purposes.
3.5.2 - Backtesting Risk Measurements	"At-risk" measures, if utilized, are subject to back-testing procedures only on an annual basis.	"At-risk" measures are subject to back-testing procedures on a quarterly basis.	"At-risk" measures are subject to back-testing procedures on a monthly basis. Backtesting is used to calibrate the VaR process against recent events and Backtesting results are presented in management's Value-at-Risk report to give an idea of the quality of the VaR calculation.

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3.6.1 - Actualization	Actual data such as prices, volumes, etc. are manually entered into spreadsheets or a system of record from various sources including spreadsheets and other temporary data storage tools.(Ideally, this data should be downloaded from the reporting source and imported into a secure database in a daily batch process). Significant manual intervention may be required to actualize data. Ability to track nominated (estimated) and actualized volumes exists.	Where possible, actual data such as prices, volumes, etc. is transferred electronically directly into the system of record. There is also a means to accept or reject actualized commodity volumes and routes prior to accepting the electronic data into the system. (Ideally, this data should be downloaded from the reporting source and imported into a secure database in a daily batch process). Significant manual intervention is not required to actualize data. Processes are in place to ensure the consistent uploading of data, and any rejected data is investigated and researched in a timely manner. The system of record enables tracking of nominated (estimated) and actualized volumes.  	Actual data such as prices, volumes, etc. is transferred electronically directly into the system of record. The system has the capability to accept or reject actualized commodity volumes and routes prior to accepting the electronic data into the system. There is no manual intervention required to actualize data. Processes are in place to ensure the consistent uploading of data, and any rejected data is investigated and researched immediately. Historical information is regularly analyzed to identify consistent problems and/or opportunities for improvement. The system of record enables tracking of nominated (estimated) and actualized volumes.
3.6.2 - Settlement Discrepancies	Settlement discrepancies are handled in a timely fashion, in accordance with established guidelines or written procedures. Any discrepancy in settlement that is more than a routine situation is brought to the attention of the Front Office and a Manager/Supervisor in the Back Office. Further action is handled and/or directed by Back Office management. Discrepancy and resolution is documented.	Settlement discrepancies are handled in a timely fashion, in accordance with established guidelines or written procedures. Any discrepancy in settlement that is more than a routine situation is brought to the attention of the Front Office and a Manager/Supervisor in the Back Office. Further action is handled and/or directed by Back Office management. All discrepancies are entered into a formal log that provides a clear audit trail of the nature of the discrepancy, means of resolution, and final resolution.  	Settlement discrepancies are handled in a timely fashion, in accordance with established guidelines or written procedures. Any discrepancy in settlement that is more than a routine situation is brought to the attention of the Front Office, Middle Office and a Manager/Supervisor in the Back Office. Further action is handled and/or directed by Back Office management. Discrepancies are updated in the system of record so that information is consistent across all areas of the system. All discrepancies are entered into a formal log, which is monitored regularly, that provides a clear audit trail of the nature of the discrepancy, means of resolution, and final resolution. The discrepancy log is reviewed by supervisory personnel (e.g., Risk Control Manager) on a periodic basis so that trends can be detected and acted upon.
3.7.1 - G/L Reconciliation - Realized	Often the general ledger cannot be completely reconciled with the trading and risk management sub ledger. Realized results of physical trading are not granular for some products or trading groups (actual shipping results cannot be linked individual trades). Companies employ manually intensive processes to assure reasonableness of results. Large gaps are researched. Reconciliation is a constant process. The audit trail is frequently unclear or non-existent.	In order to effectively post realized P&L as well as A/R and A/P balances, companies employ manually intensive processes to manage granular settlement details. It is very important that the Back Office and Controllers' group are very careful to document the audit trail associated with settlements.  	The general ledger is fully integrated with the trading and risk management sub ledger. Regular review is conducted to ensure the general ledger and the sub ledger remain consistent.

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3.7.2 - G/L Reconciliation - 	If net unrealized (MTM) amounts are manually posted to the general ledger, the results and/or processes are frequently not understood by the Back Office accounting function. A function of the Middle or Front Office performs a manual reconciliation of amounts per the trading and risk management sub ledger and other manual adjustments to source-system calculations (e.g. off-system valuations, valuation adjustments, etc.).	If net unrealized (MTM) amounts are manually posted to the general ledger, the Controllers Group (or similar Back Office accounting function), using a manual process or systematic reporting tools, performs a detailed reconciliation of amounts per the trading and risk management sub ledger (e.g. often just plain vanilla MTM calculations) and other manual adjustments to source-system calculations (e.g. off-system valuations, valuation adjustments, etc.). C F	The general ledger is fully integrated with the trading and risk management sub ledger. Regular review is conducted to ensure the general ledger and the sub ledger remain consistent.
3.7.3 - Links between hedge and exposure 	The linkage of the derivative hedge and the hedged item is documented, but is applied manually for reporting purposes. C	The linkage of the derivative hedge and the hedged item is formally documented and is maintained within the system of record. Changes to the link require management approval. F	The linkage of the derivative hedge and the hedged item is formally documented and is maintained within the system of record. Any changes to this link are properly approved by management. This link provides an adequate audit trail, including time/ date stamps to prove out contemporaneous documentation.
3.8.1 - Controls Processes 	Control activities, disclosures and operations policies and procedures are either informally or formally documented. Improvement opportunities for internal controls are documented and communicated as they come up or standardized and periodic testing are integrated through operations to ensure compliance with policies and procedures. Issues identified during periodic internal audits are maintained within business units or functions. Formal processes are in place across the organization to ensure follow-up on internal controls inconsistencies and issues identified. C	Internal controls are standardized and periodic testing are integrated through operations to ensure compliance with policies and procedures. Formal processes are in place across the organization to ensure follow-up on internal controls inconsistencies and issues identified. Accountability for implementation of improvement opportunities is assigned and monitoring processes are applied. F	Formal controls and enforcement measures are integrated within operations, standardized across the enterprise and clearly understood and respected by all employees. Internal controls are automated and integrated across operations. Feedback and compliance reports are collected at the corporate level. Processes for monitoring regulatory changes and other imperative factors are defined and assigned. Formal reviews of internal controls are performed on a regular basis, with implementation accountability assigned automatically (internal audit function).

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3.9.1 - Credit Rating Methodology	Counterparty credit ratings rely heavily on third-party agency ratings such as Standard & Poor's, Moody's, and Fitch. Alternatives such as Dun & Bradstreet may be used for those without agency ratings. An internal ratings methodology may be in place. Adjustments to agency ratings are informal and inconsistent. A simple, generic (i.e., not focused on a particular industry or counterparty type) credit-scoring tool may be in place. Creditworthiness assessments are limited to identification of basic facts, for example industry, years in business, key products and/or business units, etc.	The internal credit scoring / rating methodology incorporates an informal quantitative analysis. A limited credit-scoring methodology with a small number of scorecards and limited counterparty segmentation may be used for certain counterparties. The scorecards may have been validated prior to implementation. The quantitative credit scoring evaluation includes basic financial statement ratio (e.g., profitability, leverage, liquidity) and trend (e.g., 3-year growth of 5%) analysis. Peer analysis (i.e., comparisons to ratios and trends of similar companies) may be performed.	An internal credit scoring / rating methodology is formalized, and it is reviewed for appropriateness on an infrequent basis. It incorporates financial analysis, industry outlook & peer group comparison, and subjective analysis. Analytical tools may provide additional support/basis for assigned ratings. Multiple scorecards have been implemented for use with unique counterparty segments for which credit scoring is appropriate. The scorecards were validated prior to implementation and may be periodically re-validated. The quantitative evaluation includes detailed financial statement ratio analysis. Trend analysis is measured via compound annual growth rate (CAGR). One or more market-based indicators (e.g., equity default models, bond spreads) may be included. The qualitative assessment includes bank and trade references, information or insights that may be provided by trading/marketing/sales, third-party credit information (e.g., Moody's, S&P, Fitch), changes in transacting and/or business strategies, shifts in key management personnel, changes in risk management policies and controls, off-balance-sheet or contingent liabilities, credit triggers, environmental risks, material litigation, and competitive analysis. Detailed, formal root-cause analysis is performed to identify the drivers and understand and evaluate the likelihood of change and/or recurrence.
3.9.2 - Credit Limit Setting	Limit-setting practices may be informal or inconsistent. Where a formal matrix or methodology exists, the same limit for each counterparty may be set at an identical amount for every counterparty in a specific tier (e.g., determined by a risk rating) Limits are established for all counterparties. Documentation of approvals may be limited to the largest and/or riskiest counterparties.	The formal limit-setting methodology incorporates a matrix of limit thresholds based on counterparty creditworthiness (e.g., as measured by risk rating) and the business requirements associated with a particular counterparty (i.e., how much credit is required to support ordinary business). The matrix provides maximum unsecured limits for each tier. The limit may be determined by a simple formula (e.g., percent of tangible net worth, fixed pre-defined ranges). The formula may not have been validated prior to implementation and is not regularly reviewed for appropriateness. Limits are established for all counterparties. Formal documentation of approvals is in place for all counterparties, but may be inconsistent across business units.	The formal limit-setting methodology incorporates a matrix of limit thresholds based on counterparty creditworthiness (e.g., as measured by risk rating), business requirements associated with a particular counterparty (i.e., how much credit is required to support ordinary business), consideration of the relative scale of the counterparty to appropriately size the limit, the strength of the contract, and the tenor. The limit is determined by a formula that may incorporate multiple components (e.g., cash flow, capitalization, etc.) and which varies by tier. The methodology formula was validated prior to implementation and may be regularly reviewed for appropriateness. Formally documented and approved limits are established for all counterparties. Documentation is standardized with flexibility to incorporate business unit-specific customizations.

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3.9.3 - Credit Counterparty Review	Most counterparties are reviewed on an ad-hoc basis as triggered by a request for a limit increase or annually. Those with agency ratings may be reviewed less frequently. Primary credit files are typically physical, and include documented credit assessments, limit approvals, and limited to no supporting information. Documentation may be incomplete or inconsistent and the ability of a third-party to understand the risk assessment and credit limit may vary accordingly.	Policy requires that counterparties are reviewed annually. Large and/or high-risk counterparties may be reviewed more frequently. Credit files include documented credit assessments and limit approvals. They may also include news, internal and/or agency ratings/changes, contracts, collateral issues, etc. Files may be physical and electronic, but there may not be a centralized repository for storing electronic credit file data. Documentation may be incomplete or inconsistent and the ability of a third-party to understand the risk assessment and credit limit may vary accordingly. C F	Policy requires that counterparties are reviewed at least annually, based on updated financial information. The top counterparties by exposure and the more volatile counterparties are reviewed more frequently or at least quarterly (upon release of quarterly financial statement information) or as warranted by material events, news, etc. Credit files include documented credit assessments, limit approvals, news, internal and/or agency ratings/changes, contracts, collateral issues, etc. Files provided may be either physical or electronic but are primarily electronic (up-to-date, centralized repository), and are robust enough for any outside party to quickly understand the counterparty's risk assessment and credit limit.
3.9.4 - Collateral Management, Credit Limit Monitoring and Credit Reporting	There may not be a specific group in place to analyze collateral balances and collateral requirements, ineligible collateral, and collateral movements. Monitoring of collateral is performed on an infrequent or reactive basis by either the credit department, or front-office personnel. Credit limits are monitored on a reactive basis or daily basis based on the prior day's closing data. Limit violations tend to be caught during the nightly transaction processing within the system. Trading/marketing/sales (and management) are informed of any violations the next day. There are limited to no controls to identify the entry of transactions that violate established limits. Monitoring on an intra-day basis is not conducted due to system constraints at most transacting organizations. Transactions that would exceed established limits are not regularly pre-approved.	There may not be a specific group in place to analyze collateral balances and collateral requirements, ineligible collateral, and collateral movements. Monitoring of collateral requirements is performed on a regular basis by either the credit department, or front-office personnel. Credit limit availability is updated based on prior-day closing data, and made available to traders/sales & marketing each morning, prior to the start of business. Any transaction that would exceed established limits must be pre-approved by a function independent of the transacting function. Controls are in place to provide after-the-fact reporting to identify the entry of transactions that violate established limits. C F	Collateral Management analyzes collateral balances and collateral requirements, ineligible collateral, and collateral movements in a regular manner, typically daily and closely communicates with Credit and Treasury. The system calculates margin daily. There is an established process to handle defaults quickly. Collateral may exchange MTM reports with counterparties on a regular basis to reduce MTM disputes when margin payments are demanded. Credit limit availability is updated and accessible on a real-time basis or prior to market openings. There is continuous communication between the credit department and/or middle office and the trading/marketing/sales function to ensure that all parties are aware when credit limits are being approached. Prior to execution, trading/marketing/sales verify counterparty status, transaction compliance with established limits, and product authorization. Controls are in place to provide real-time automated notifications to the credit department and/or after-the-fact reporting of transactions that violate established limits. Trading/marketing/sales is required to review intra-day availability information to verify counterparty status, transaction compliance with established limits, and product authorization prior to execution of transactions. Any transaction that would exceed established limits must be pre-approved by a function independent of the transacting function.

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4.1.1 - Visibility of All Risks / Commodities	In order to address the company's transacting profile, multiple transaction capture systems are used to handle different commodities, geographic regions, or risk types (physical/financial). Additionally, a significant number of transactions may still be stored or managed in spreadsheets. There is little to no consolidated exposure reporting and it is still a complicated manual exercise. C	In order to address the company's transacting profile, multiple transaction capture systems may still be used to handle different commodities, geographic regions, or risk types. Transacting system functionality addresses all trade types and no transactions are wholly managed in spreadsheets. Consolidated reporting is available through interfaces to external reporting systems. These interfaces happen after daily batch processing and create an additional lag in receiving consolidated exposure/position reporting. F	Transactions for all commodities, regions and risk types are captured in the same system. Consolidated risk exposure reporting is automated and timely. Additionally since all trades are in the same system, then reports that allow drilling into more detailed data and into specific trade details are available.
4.1.2 - Deal Capture	Deals continue to be captured in spreadsheets. A consolidated risk system is introduced where financial deals are captured but physical deal capture tends to be sporadic. There is no assurance that physical deals are captured accurately. Deals are regularly captured the following day or later.	All deals are captured in a consolidated risk system before the end of the business day. Any errors in deal entry are corrected the following day. Deal sign-off might or might not take place. C	All deals (financial, physical, options, etc.) are captured in one consolidated risk system immediately upon transaction execution. Deal entry is performed according to consistent, documented methodologies across all trade books. Deal sign-off takes place to assure that deals are complete and accurate before the end of day process begins. Independent middle-office personnel monitor for compliance exceptions which are captured in the system. Violations carry legitimate consequences. F
4.1.3 - Review and Approval of Market Data Sourcing and Valuation Methodologies	Market data sourcing methodologies are inconsistent across the different groups and business units performing this activity. Methodologies are often developed in response to specific needs with little or no integration or communication. Front office personnel usually have significant responsibility for sourcing data but there may be limited independent risk management validation. Market risk measurement (valuation) methodologies are basic in nature. Methodologies are neither documented nor well understood outside of the specific personnel performing the activity. A generic volatility and correlation model is used to develop option prices. This model tends to be static across locations and time. There is limited to no documentation of any processes and procedures and only sporadic review of any models used. Models are only tested on an ad hoc or periodic basis as middle-office personnel may not have the appropriate	Market data sourcing methodologies are consistent across the different groups and business units performing this activity. Methodologies are developed to consistently source, aggregate and validate data. There is a basic level of integration and communication between business units and various functions. Independent risk management personnel have primary responsibility for sourcing and validating data while front office personnel may provide additional insight upon request. Market risk measurement (valuation) methodologies are developed and validated by independent middle-office personnel. Methodologies have basic documentation and are understood outside of the specific personnel performing the activity. Volatilities and correlations are calculated "in-house" using internal or "off-the-shelf" option valuation models. These models are maintained and updated by front-office personnel.	Independent Risk Management develops market data sourcing methodologies and market risk measurement (valuation) methodologies and presents them to the RMC for approval. All methodologies are thoroughly documented and are considered in periodic compliance reviews that seek to ensure that methodologies are consistently applied. Broker quotes and trade publications provide a valuable source for obtaining market data for many commodity delivery locations. Front Office personnel may provide input on sourcing market data from brokers and other sources, but such prices are be subject to validation by an independent function. Volatilities and correlations should be updated and validated on a frequent basis using a consistent, approved methodology. Volatilities may be sourced from OTC brokers. The broker may quote an explicit volatility, but usually an "At-the-money" ("ATM") option price is quoted. If an ATM price is quoted, management uses volatility development methodologies which consider a hybrid of historical volatilities and other available market data to solve for volatility. Broker-quoted volatilities and ATM option prices are representative of implied volatilities. In some cases, implied correlations can be inferred from

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	knowledge and skills to perform a thorough independent review. Documentation of methodologies, processes, procedures and assumptions tends to be very basic. C		broker data, but in most cases, correlations will be computed as part of the volatility calculation. F
4.2.1 - Planned Reporting	A procedure exists to pull planned reports from individual systems, but data can not be pulled from multiple systems at once. Physical reports are manually generated by aggregation of multiple spreadsheets or lines of data. Reports may be inaccurate due to human errors. Reports are often limited because necessary data attributes are not saved in the data model, which prevents reporting on the desired dimensions Reports may not be available on a timely basis depending on approach used to aggregate data across multiple systems. C	Technology capabilities provide exception reporting that highlights changes in market data from day-to-day. Middle Office has the ability to filter significant changes in market data. Filters are flexible and may be changed based on Middle Office's professional judgment and understanding of market conditions and positions outstanding. The transacting system is able to aggregate data from multiple sources as appropriate. The reports can be independently verified within each system to ensure accuracy. Reports are consolidated across multiple systems and create a single reporting repository. Limited manual intervention is needed for consolidated reporting Reports may are available on a timely basis depending on approach used to aggregate data across multiple systems. F	Reports are produced with little to no user interaction using a procedure manager or automated process. This automatic process is able to distribute the report to pre-defined distribution lists at a specified time interval. Many commonly requested and critical data elements of pre-summarized and pre-aggregated in a reporting database that ensures timely reporting. The data model and data capture processes are rich enough to ensure that reports can be generated along the dimensions needed by the business. The generation, production, and display of these reports are governed by IT security policy.
4.2.2 - Confirmations	Transaction confirmations are sent/received by a function independent of the transacting function for all deals within 48 or 72 hours. Status of the deals in the confirmations process is updated in spreadsheets or periodically in the system of record. Reports detailing the status of confirmations are generated and reviewed regularly or on a periodic basis.	Transaction confirmations are sent/received by a function independent of the transacting function for all deals within 24 hours. The status of deals in the confirmation process is actively tracked in the system of record. Reports detailing the status of confirmations are generated and reviewed on a weekly basis. C F	Transaction confirmations are sent/received by a function independent of the transacting function for all deals on a daily basis. The status of deals in the confirmation process is actively tracked in the system of record. Reports detailing the status of confirmations are generated and reviewed on a daily basis.

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4.3.1 - Transaction Completeness and	Several system tools like uneditable transaction capture dates, trader checkout process and transaction confirmations are available, but may not be consistently applied or enforced, so end of day processes may not always include all transactions. Interfaces between systems may be manual or require manual reconciliations that occasionally leads to downstream systems having incomplete data C	System tools like uneditable transaction capture dates and confirmations are available and utilized in end of day processing controls so that end of day position reporting ordinarily includes all trades. Interfaces between systems may be manual or require manual reconciliations that occasionally leads to downstream systems having incomplete data. F	System tools like uneditable trade capture dates, trader checkout and trade confirmations are available and consistently applied so the end of day position reporting ordinarily includes all trades. Interfaces between systems are automated as are the interface completeness controls so that the data synchronization between systems is high.
4.3.2 - End of Day Processing	A standardized End Of Day process exists. This process describes sequence of events taken to ensure that all deals are captured, that all market prices have been entered, scheduling for the day has been completed and that the transacting system is ready for end of day processing to proceed. However, limitations in the process, or in the execution of the process, yield a state where many challenges still exist in the end of day processes. Critical reports like the Margining report, Position Report, Mark to Market report and Risk Exposure Reports are often inaccurate and need to be re-executed because data was not complete before the end of day process began or possibly because data was being edited during execution. C	A standardized End Of Day process exists, driven by automation of reports. This process describes sequence of events taken to ensure that all deals are captured, that all market prices have been entered, scheduling for the day has been completed and that the transacting system is ready for end of day processing to proceed. Ordinarily the prescribed sequence of steps is executed correctly and critical reports like the Margining report, Position Report, Mark to Market report and Risk Exposure Reports are accurate. However, there are occasions where key tasks are not executed correctly and this leads to inaccuracy and the need to re-execute the process. F	A standardized End Of Day process exists. This process describes sequence of events taken to ensure that all deals are captured, that all market prices have been entered, scheduling for the day has been completed and that the transacting system is ready for end of day processing to proceed. Additionally, a solid mixture of automated and manual controls exist to ensure that all prescribed steps are executed. These controls ensure that critical daily reports like the Margining Report, Position Report, Mark to Market report and Risk Exposure Reports are accurate, and exceptions to that are very rare.