

**KCP&L GREATER MISSOURI
OPERATIONS COMPANY (GMO)**

INTEGRATED RESOURCE PLAN

2016 ANNUAL UPDATE

MARCH, 2016



TABLE OF CONTENTS

SECTION 1: EXECUTIVE SUMMARY.....	1
1.1 UTILITY INTRODUCTION	1
1.2 CHANGES FROM THE 2015 TRIENNIAL IRP.....	6
1.3 2016 ANNUAL UPDATE PREFERRED PLAN.....	6
SECTION 2: LOAD ANALYSIS AND LOAD FORECASTING UPDATE	12
2.1 CHANGES FROM THE 2015 TRIENNIAL IRP.....	12
SECTION 3: SUPPLY-SIDE RESOURCE ANALYSIS UPDATE.....	16
3.1 FUEL AND EMISSION FORECAST CHANGES FROM THE 2015 TRIENNIAL IRP.....	16
3.1.1 SUPPLY-SIDE TECHNOLOGY CANDIDATE RESOURCE OPTIONS	32
3.1.2 LIFE ASSESSMENT & MANAGEMENT PROGRAM	35
SECTION 4: TRANSMISSION AND DISTRIBUTION UPDATE	36
4.1 CHANGES FROM THE 2015 TRIENNIAL IRP.....	36
4.2 RTO EXPANSION PLANNING	36
4.3 ADVANCED DISTRIBUTION TECHNOLOGIES DISCUSSION	37
4.3.1 SCADA-LIKE MONITORING AND CONTROL VIA OMS	37
4.3.2 FAULT ISOLATION AND SERVICE RESTORATION (FISR)	38
4.3.3 OMS FAULT LOCATION FUNCTIONALITY	41
4.3.4 COMMUNICATING FAULTED CIRCUIT INDICATOR (CFCI) PILOTS.....	41
4.3.5 2G CELLULAR COMMUNICATIONS REPLACEMENT	42
4.3.6 4G CELLULAR COMMUNICATIONS PILOT	42
4.3.7 DEVELOP A MULTIYEAR DISTRIBUTION AUTOMATION ROADMAP	42
SECTION 5: DEMAND-SIDE RESOURCE ANALYSIS UPDATE.....	44
5.1 MEEIA CYCLE 2 2016-2018 PROGRAMS	44

5.2	CHANGES FROM THE 2015 TRIENNIAL IRP.....	46
SECTION 6: INTEGRATED RESOURCE PLAN AND RISK ANALYSIS UPDATE.....		47
6.1	CHANGES FROM THE 2015 TRIENNIAL IRP.....	47
6.2	ALTERNATIVE RESOURCE PLAN NAMING CONVENTION	49
6.3	REVENUE REQUIREMENT	56
6.4	PERFORMANCE MEASURES.....	57
6.5	UNSERVED ENERGY	59
6.6	JOINT-PLANNING KCP&L/GMO RESOURCE PLANS.....	60
6.7	JOINT-PLANNING ECONOMIC IMPACT.....	71
6.8	JOINT-PLANNING ANNUAL GENERATION	72
6.9	JOINT-PLANNING ANNUAL EMISSIONS	73
SECTION 7: RESOURCE ACQUISITION STRATEGY.....		74
7.1	2016 ANNUAL UPDATE PREFERRED PLAN.....	74
7.1.1	PREFERRED PLAN COMPOSITION.....	75
7.1.2	PREFERRED PLAN ECONOMIC IMPACT	77
7.1.3	PREFERRED PLAN ANNUAL GENERATION	78
7.1.4	PREFERRED PLAN ANNUAL EMISSIONS.....	79
7.1.5	PREFERRED PLAN DISCUSSION	80
7.2	CRITICAL UNCERTAIN FACTORS.....	81
7.2.1	CRITICAL UNCERTAIN FACTOR: HIGH LOAD GROWTH.....	83
7.2.2	CRITICAL UNCERTAIN FACTOR: LOW LOAD GROWTH	84
7.2.3	CRITICAL UNCERTAIN FACTOR: HIGH NATURAL GAS PRICES	85
7.2.4	CRITICAL UNCERTAIN FACTOR: LOW NATURAL GAS PRICES.....	86
7.2.5	CRITICAL UNCERTAIN FACTOR: CO ₂ - YES.....	87
7.2.6	CRITICAL UNCERTAIN FACTOR: CO ₂ - NO	88

7.2.7	CRITICAL UNCERTAIN FACTORS – SUMMARY AND EVALUATION	89
7.3	IMPLEMENTATION PLAN	92
7.3.1	DEMAND-SIDE MANAGEMENT SCHEDULE	93
SECTION 8: SPECIAL CONTEMPORARY ISSUES		95
8.1	IMPACTS OF EMERGING ENERGY EFFICIENCY TECHNOLOGIES	95
8.2	IMPACTS OF EMERGING ENERGY STORAGE TECHNOLOGIES	98
8.3	ENVIRONMENTAL CAPITAL AND OPERATING COSTS FOR COAL-FIRED GENERATING UNITS	106
8.4	TRANSMISSION GRID IMPACTS	117
8.5	DISTRIBUTED GENERATION POTENTIAL	117
8.6	ENERGY EFFICIENCY FINANCING	121
8.7	CLEAN POWER PLAN COMPLIANCE	123
8.8	SOLAR ASSESSMENT	124
8.9	TRANSMISSION GRID IMPACTS	124
8.10	GENERATION COST AND PERFORMANCE DATA	125
8.11	IMPACT OF EMERGING ENERGY EFFICIENCY TECHNOLOGIES	127

TABLE OF TABLES

Table 1: GMO Customers, NSI and Peak Demand	3
Table 2: GMO Capacity and Energy By Resource Type	3
Table 3: 2016 Annual Update Preferred Plan Capacity Additions	10
Table 4: 2016 Annual Update Preferred Plan	11
Table 5: GMO Mid-Case Annual Forecast ** Highly Confidential **	14
Table 6: Coal Forecasts - 2015 IRP Vs. 2016 Annual Update Graphic** Highly Confidential **	17
Table 7: Coal Forecasts - 2015 IRP Vs. 2016 Annual Update ** Highly Confidential ** ..	18
Table 8: Natural Gas Forecasts - 2015 IRP Vs. 2016 Annual Update Graphic ** Highly Confidential **	19
Table 9: Natural Gas Forecasts - 2015 IRP Vs. 2016 Annual Update ** Highly Confidential **	20
Table 10: Fuel Oil Forecasts - 2015 IRP Vs. 2016 Annual Update Graphic ** Highly Confidential **	21
Table 11: Fuel Oil Forecasts - 2015 IRP Vs. 2016 Annual Update ** Highly Confidential **	22
Table 12: SO ₂ Forecasts - 2015 IRP Vs. 2016 Annual Update Graphic ** Highly Confidential **	23
Table 13: SO ₂ Forecasts - 2015 IRP Vs. 2016 Annual Update ** Highly Confidential ** .	24
Table 14: NO _x Annual Forecasts - 2015 IRP Vs. 2016 Annual Update Graphic ** Highly Confidential **	25
Table 15: NO _x Annual Forecasts - 2015 IRP Vs. 2016 Annual Update ** Highly Confidential **	26
Table 16: NO _x Seasonal Forecasts - 2015 IRP Vs. 2016 Annual Update Graphic** Highly Confidential **	27

Table 17: NO _x Seasonal Forecasts - 2015 IRP Vs. 2016 Annual Update ** Highly Confidential **	28
Table 18: CO ₂ Forecast - 2015 IRP Vs. 2016 Annual Update Graphic ** Highly Confidential **	29
Table 19: CO ₂ Forecast - 2016 Annual Update ** Highly Confidential **	30
Table 20: Fuel Forecast Sources.....	31
Table 21: Emission Forecast Sources	31
Table 22: Supply-Side Technology Candidates ** Highly Confidential **	33
Table 23: GMO - MEEIA 36 Month Plan Period**Highly Confidential**	45
Table 24: GMO Option C / RAP	47
Table 25: Alternative Resource Plan Naming Convention.....	50
Table 26: Alternative Resource Plan Overview.....	51
Table 27: Alternative Resource Plan Overview (continued).....	53
Table 28: Twenty-Year Net Present Value Revenue Requirement.....	56
Table 29: Expected Value of Performance Measures ** Highly Confidential **	57
Table 30: Expected Value of Unserved Energy	59
Table 31: Joint-Planning Alternative Resource Plan Naming Convention	61
Table 32: Overview of Joint-Planning Resource Plans	62
Table 33: Joint-Planning Twenty-Year Net Present Value Revenue Requirement	64
Table 34: Joint Plan Results With CO ₂ Restrictions.....	65
Table 35: Joint Plan Results Without CO ₂ Restrictions	65
Table 36: Joint-Planning Expected Value of Performance Measures ** Highly Confidential **	66
Table 37: Joint-Planning Alternative Resource Plan	70

Table 38: Joint-Planning Alternative Resource Plan - Economic Impact	** Highly Confidential **
Confidential **	71
Table 39: Joint-Planning Alternative Resource Plan CBBCA Annual Generation	72
Table 40: Joint-Planning Alternative Resource Plan CBBCA Annual Emissions	73
Table 41: 2016 Annual Update Preferred Plan	74
Table 42: Preferred Plan Capacity Composition	75
Table 43: Preferred Plan Economic Impact	** Highly Confidential **
Table 44: Preferred Plan Annual Generation	78
Table 45: Preferred Plan Annual Emissions	79
Table 46: Alternative Resource Plan NPVRRs	89
Table 47: Endpoint/Lowest NPVRR Alternative Resource Plan	90
Table 48: Cumulative Probabilities of Lowest NPVRR Plans	91
Table 49: DSM Program Schedule	94
Table 50: Environmental Capital Cost Estimates	** Highly Confidential **
Table 51: Environmental Fixed O&M Estimates	** Highly Confidential **
Table 52: Environmental Variable O&M Estimates	** Highly Confidential **
Table 53: Projected Annual CO ₂ Emissions With CO ₂ Restrictions	113
Table 54: Projected Annual CO ₂ Emissions Without CO ₂ Restrictions	115
Table 55: GMO Solar PV Projections	119
Table 56: Supply Side Technology Analysis	** Highly Confidential **
	126

TABLE OF FIGURES

Figure 1: Great Plains Energy Service Territory	2
Figure 2: GMO Capacity By Resource Type.....	4
Figure 3: GMO Energy By Resource Type	4
Figure 4: 2016 Preferred Plan - Years 2016 through 2026	8
Figure 5: 2016 Joint-Planning Alternative Resource Plan CBBCA - Years 2016 through 2026.....	68
Figure 6: Critical Uncertain Factors With Decision Tree Probabilities.....	81
Figure 7: Maturity of Energy Storage Technologies	99
Figure 8: Storage Capacity in 2050	100
Figure 9: Value of Distributed Electric Storage in Texas Findings.....	103
Figure 10: PESS Installation at SmartGrid Demonstration House	105

TABLE OF APPENDICES

Appendix A: 2016 SPP Transmission Expansion Plan Report

Appendix A1: 2016 SPP Transmission Expansion Plan Project List

Appendix B: Capacity Balance Spreadsheets HC

Appendix C: 2015 Final Technical Report Smart Grid

Appendix D: Generation and Emissions for Each Alternative Resource Plan

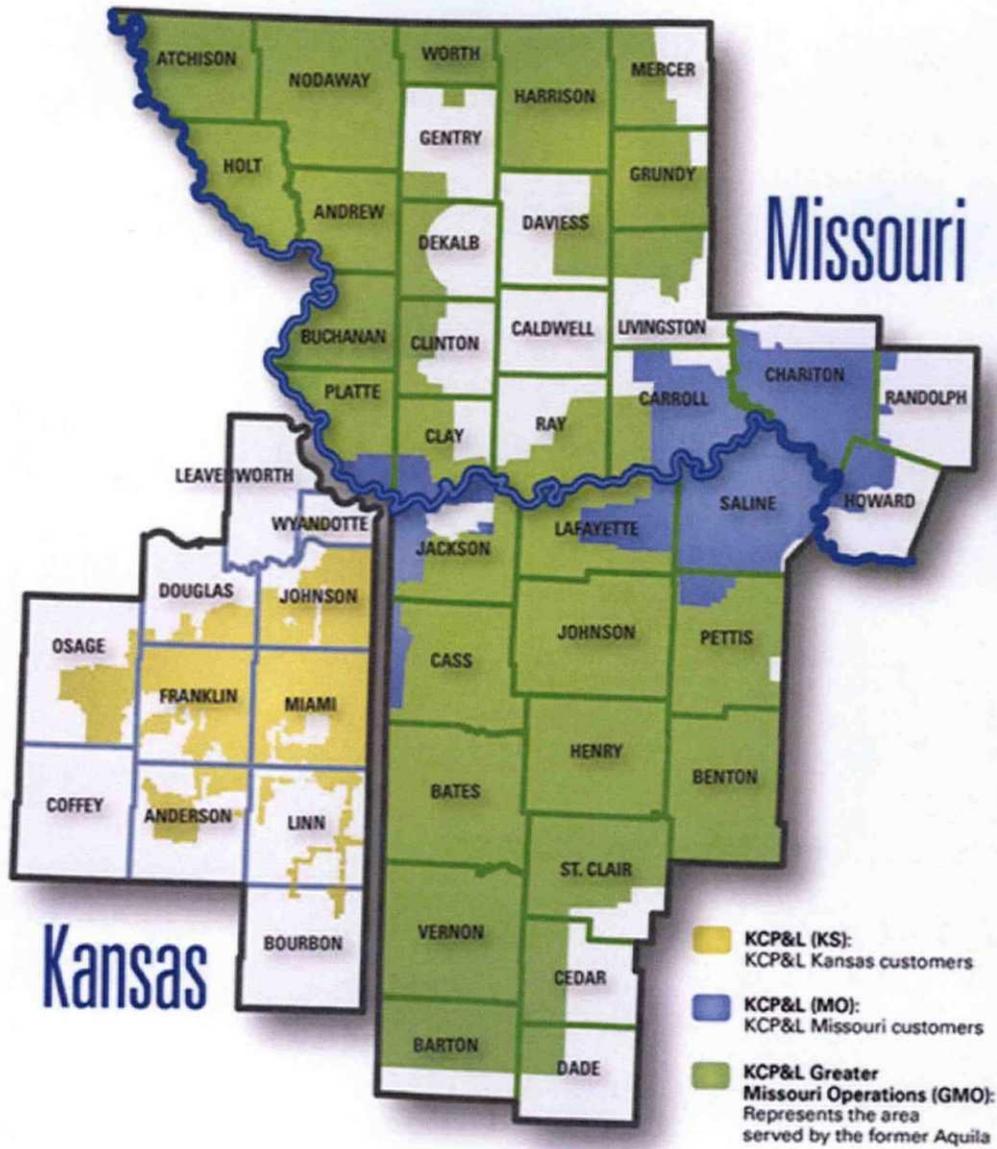
Appendix E: Economic Impact for Each Alternative Resource Plan HC

SECTION 1: EXECUTIVE SUMMARY

1.1 UTILITY INTRODUCTION

GMO is an integrated, mid-sized electric utility serving portions of Northwest Missouri including St. Joseph and several counties south and east of the Kansas City, Missouri metropolitan area. GMO also provides regulated steam service to certain customers in the St. Joseph, Missouri area. A map of the Great Plains Energy (GPE) service territory which includes GMO is provided in Figure 1 below:

Figure 1: Great Plains Energy Service Territory



GMO is significantly impacted by seasonality with approximately one-third of its retail revenues recorded in the third quarter. Table 1 provides a snapshot of the number of customers served, estimated retail sales and peak demand for 2015.

Table 1: GMO Customers, NSI and Peak Demand

Jurisdiction	Number of Retail Customers	Retail Sales (MWh)	Net Peak Demand (MW)
MPS	252,664	5,914,594	1,430
SJLP	65,486	2,056,023	447
GMO	318,150	7,970,617	1,841

GMO owns and operates a diverse generating portfolio and Power Purchase Agreements (PPA) to meet customer energy requirements. Table 2, Figure 2, and Figure 3 reflect GMO's generation assets including wind PPAs currently in place.

Table 2: GMO Capacity and Energy By Resource Type

Capacity By Fuel Type	Capacity (MW)	% of Total Capacity	Estimated Energy (MWh)	% of Annual Energy
Coal	921	41.0%	4,601,000	87.9%
Oil	59	2.6%	150	0.0%
Nat. Gas	1,106	49.2%	62,300	1.2%
Wind	159	7.1%	561,000	10.7%
Landfill Gas	1.6	0.1%	12,500	0.2%
Solar		0.0%		0.0%
Total	2,246	100.0%	5,236,950	100.0%

* Wind capacity is based upon nameplate capacity

Figure 2: GMO Capacity By Resource Type

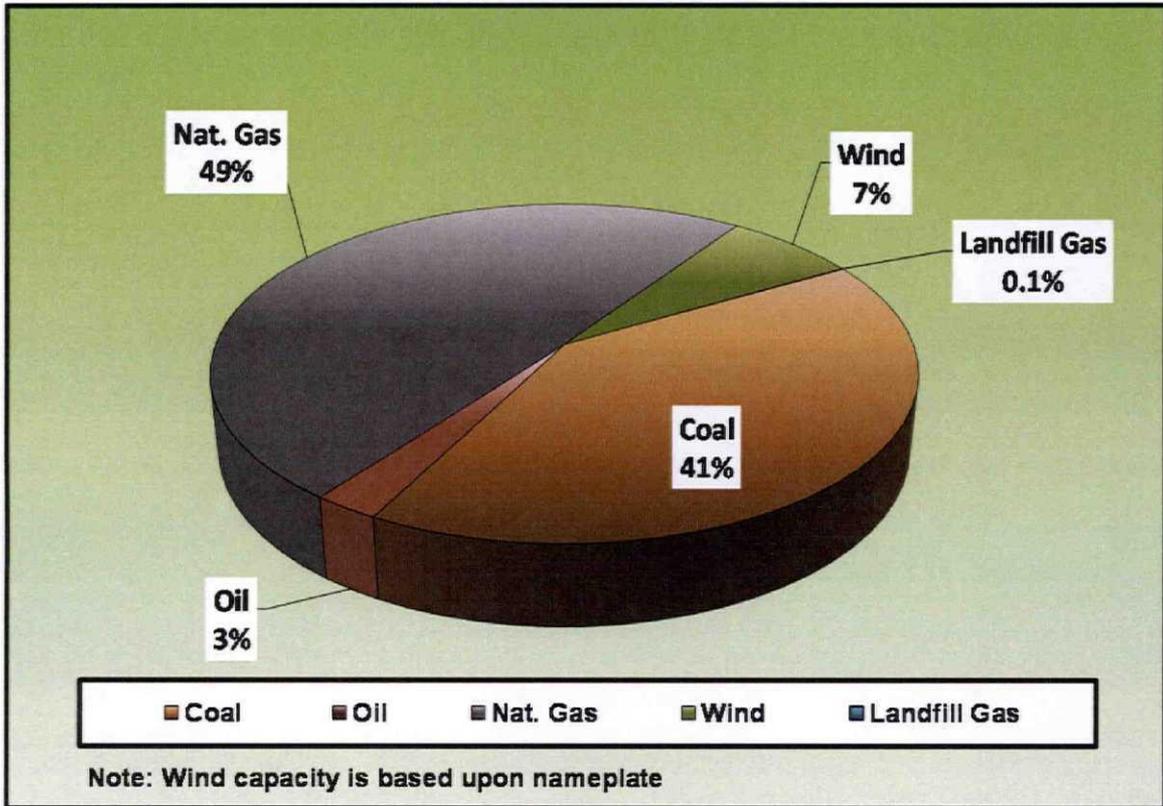
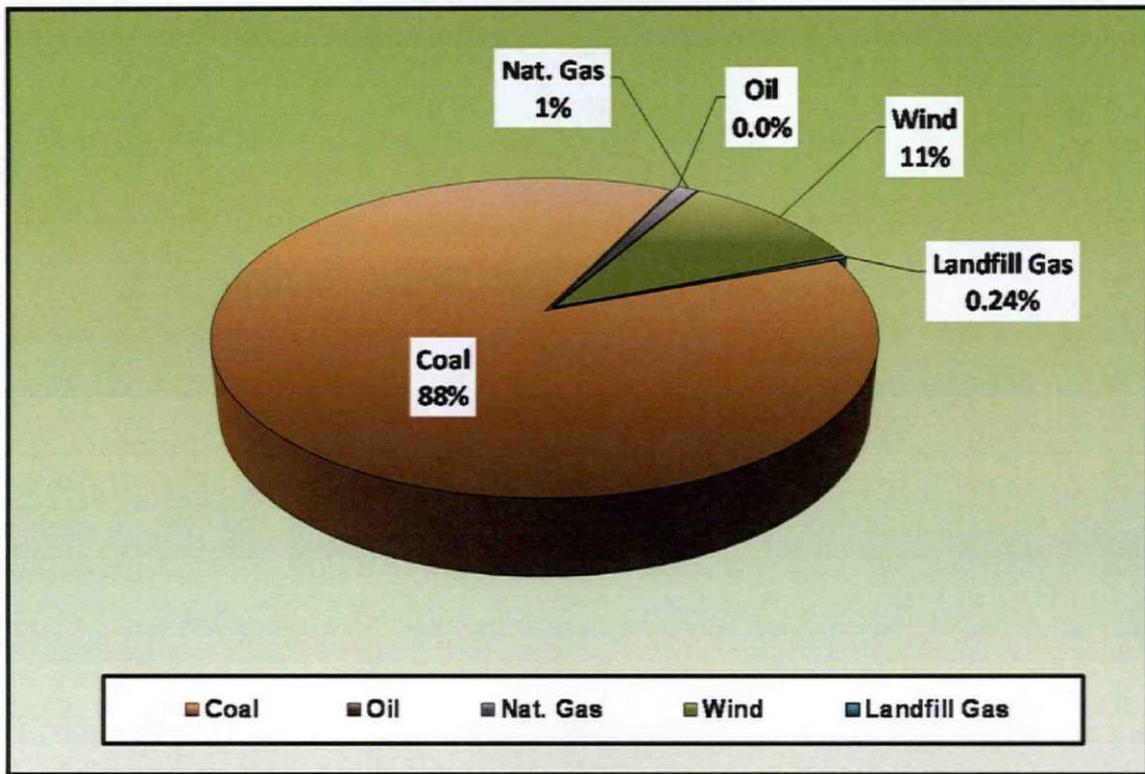


Figure 3: GMO Energy By Resource Type



1.2 CHANGES FROM THE 2015 TRIENNIAL IRP

Since the filing of the 2015 Triennial IRP, changing conditions, or major drivers, were refreshed to reflect the latest information and forecasts available to determine if the Preferred Plan and associated Resource Acquisition Strategy identified in 2015 Triennial IRP continue to be the company's path forward. The information and forecasts that have been updated for the 2016 Annual Update included:

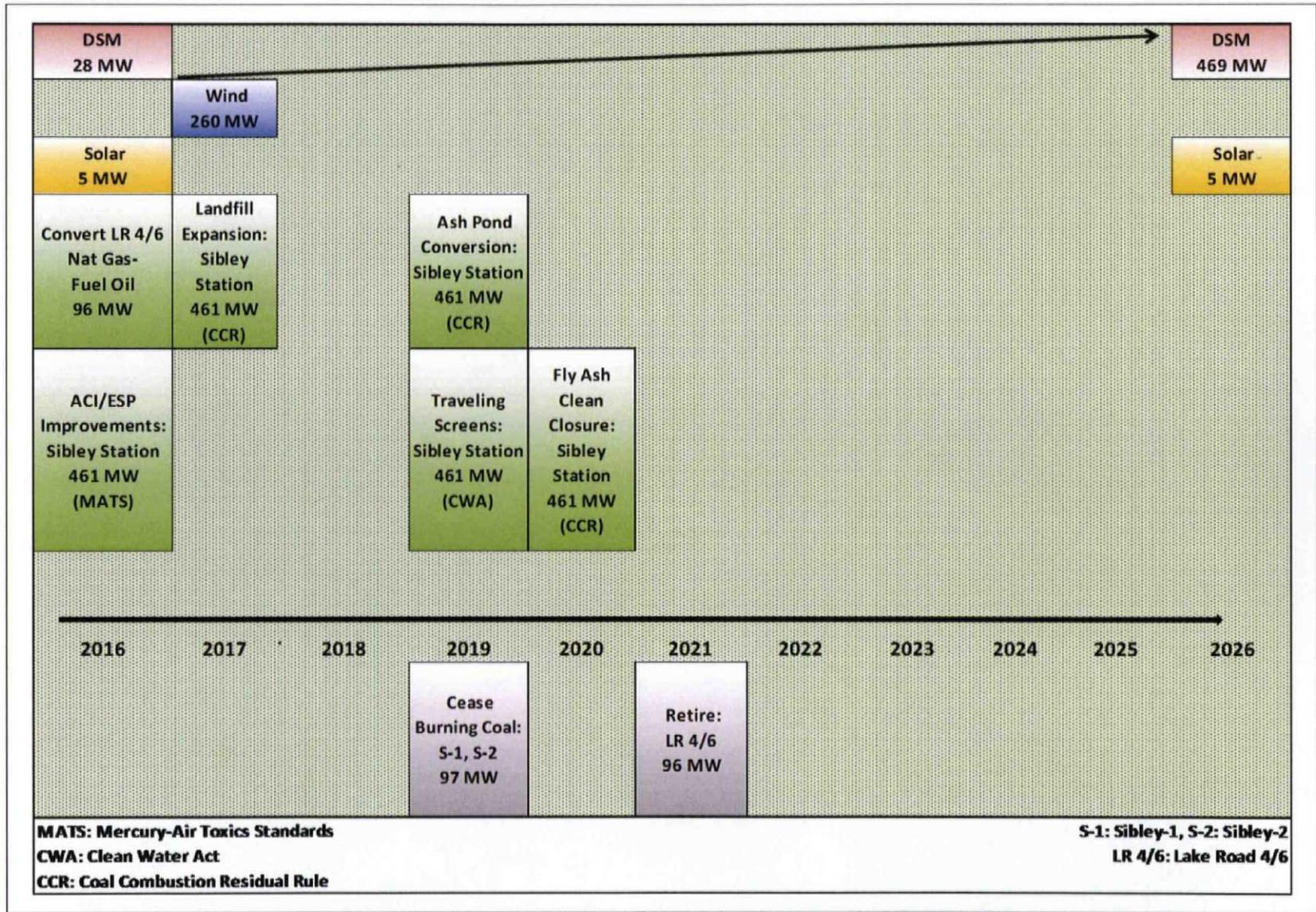
- Proposed and Potential Environmental Regulations
- Load, Fuel, and Emissions Forecast Projections
- Demand-Side Management (DSM) Program levels

1.3 2016 ANNUAL UPDATE PREFERRED PLAN

The 2016 Annual Update analysis resulted in no material change from the 2015 IRP Preferred Plan. The Preferred Plan is comprised of the following components for years 2016 – 2026 shown in Figure 4 below. Based in part upon current Missouri RPS rule requirements, the Preferred Plan includes 10 MW of solar additions and 310 MW of wind additions over the twenty-year planning period. It should be noted that the solar resource addition in 2016 is expected to consist of ownership in 2 MW Commercial and Industrial rooftop installations and 3 MW of a central station solar facility located at Greenwood, Missouri. The 260 MW wind addition is planned for 2017. DSM resources consist of a suite of eight residential and eight commercial programs three of which are demand response programs, two are educational programs, and eleven energy efficiency programs. The Preferred Plan reflects Sibley Units 1 and 2 ceasing to burn coal in 2019 and the 96 MW Lake Road 4/6 converting to natural gas in 2016 and then retiring by 2021. The environmental drivers that contributed to discontinuing coal use, and the Lake Road 4/6 retirement, include Mercury and Air Toxics Standards Rule, Ozone National Ambient Air Quality Standards (NAAQS), PM NAAQS, Clean Water Act Section 316(a) and (b), Effluent

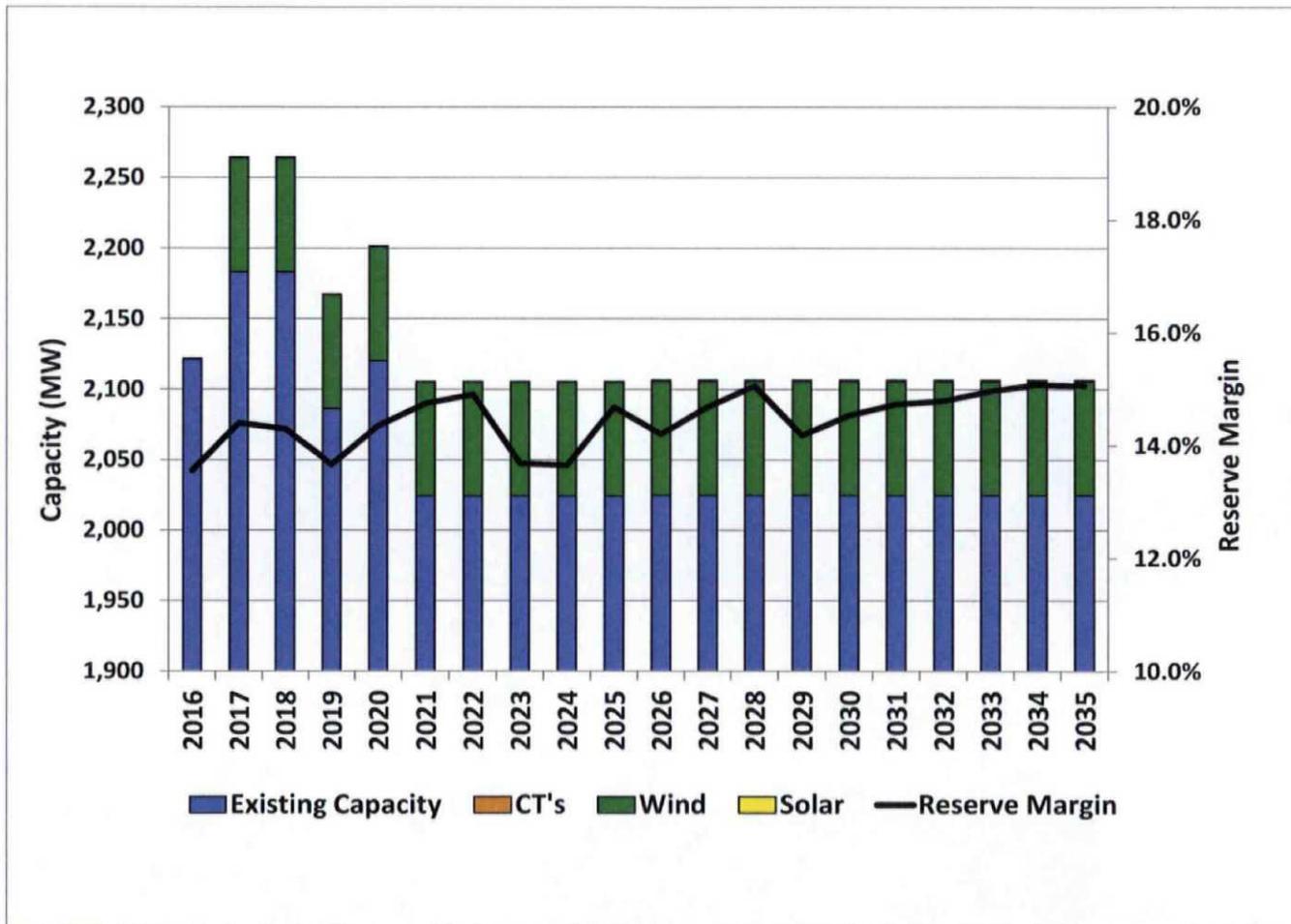
Guidelines, Coal Combustion Residuals Rule, and Clean Power Plan. These rules will be monitored by GMO to determine if the decision to cease burning coal and to retire Lake Road 4/6 in the projected retirement year continues to be prudent.

Figure 4: 2016 Preferred Plan - Years 2016 through 2026



Existing and new capacity additions for the 2016 Annual Update Preferred Plan are shown in Table 3 below:

Table 3: 2016 Annual Update Preferred Plan Capacity Additions



The 2016 Annual Update Preferred Plan for the 20-year planning period is shown in Table 4 below:

Table 4: 2016 Annual Update Preferred Plan

Year	CT's (MW)	Wind (MW)	Solar (MW)	DSM (MW)	Retire (MW)	Existing Capacity (MW)
2016	0		5	28		2121
2017	0	260		66		2183
2018	0			99		2183
2019	0			136	97	2086
2020	0			192		2120
2021	0			249	96	2024
2022	0			307		2024
2023	0			364		2024
2024	0			420		2024
2025	0			445		2024
2026	0		5	469		2025
2027	0			491		2025
2028	0			512		2025
2029	0			532		2025
2030	0			549		2025
2031	0			565		2025
2032	0			581		2025
2033	0			596		2025
2034	0			610		2025
2035	0			624		2025

SECTION 2: LOAD ANALYSIS AND LOAD FORECASTING UPDATE

2.1 CHANGES FROM THE 2015 TRIENNIAL IRP

Several inputs to the load forecasting models were updated for this filing.

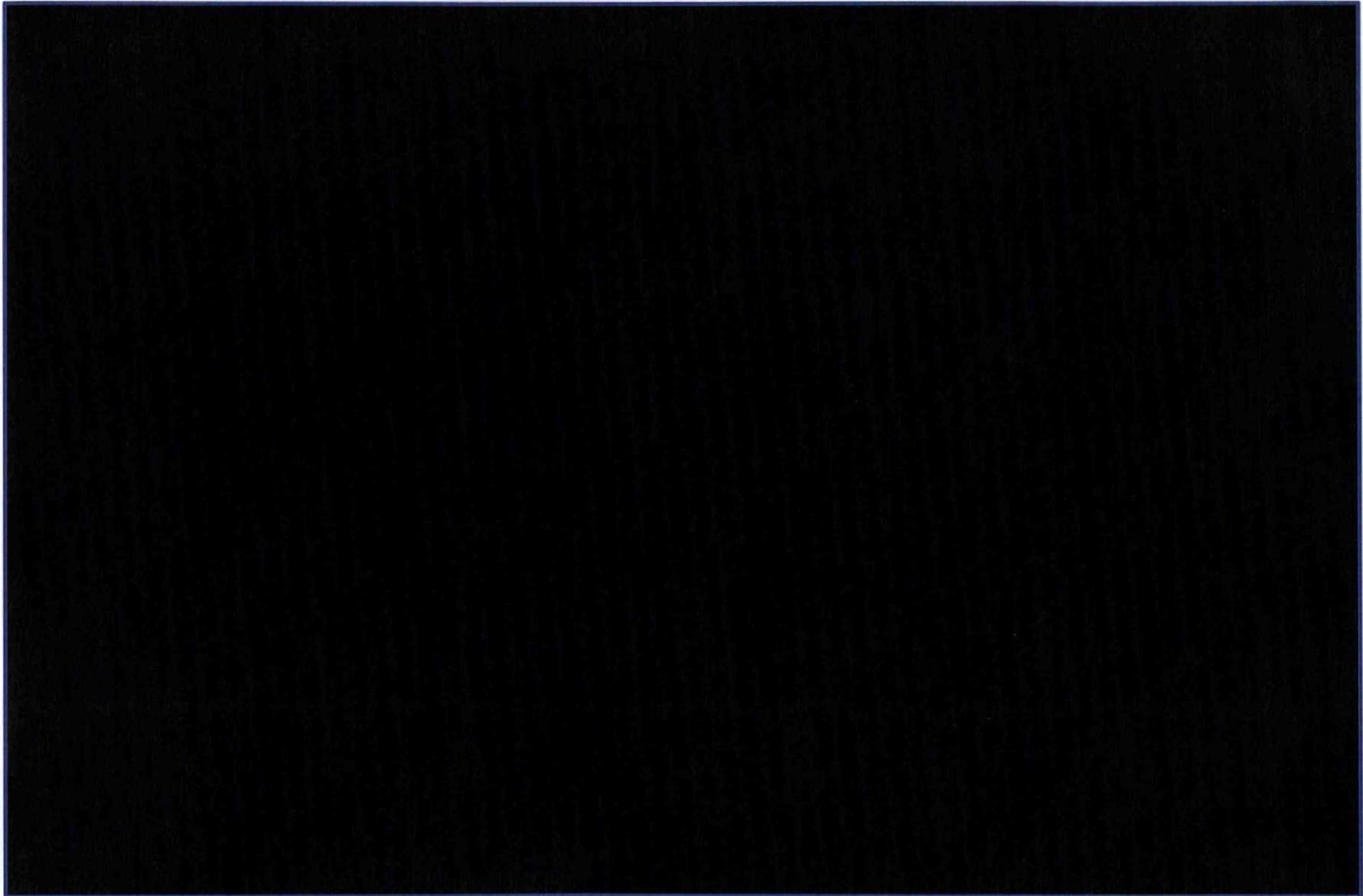
- The economic forecasts for the KC metro area were updated. In the 2015 Triennial filing, GMO used forecasts produced by Moody's Analytics in July 2014. In this 2016 Annual Update filing, the forecasts were produced in June 2015.
- Billing statistics were updated through June 2015 for this filing. In the 2015 Triennial filing, the statistics were current through July 2014. These statistics include the number of customers, kWh sales and dollars per kWh.
- Forecasts of saturations and appliance use are updated annually by the US DOE. In this filing, GMO used the results from DOE's 2015 models. In the 2015 Triennial filing, KCP&L used results from the 2014 models.
- The industrial models structure in the 2015 Triennial has change to an industrial based Statistically Adjusted Employment-Intensity Model in the 2016 Annual Update. This structure utilizes a framework that incorporates sector employment, price and sector intensities (MWh/Employee). This results in a sector weighted employment index used within the regression model.
- The methodology used to calculate peak load in the 2015 Triennial has changed from a bottom up approach to standalone jurisdictional peak models which incorporates the energy end use forecast by class in to the model. The models are also designed to weather normalize peak loads. This approach was adopted in the 2016 Annual Update.
- Historical weather normalized kWh sales are no longer derived within the forecasting models as in the 2015 Triennial filing. Historical weather normalized results for billed

kWh sales, calendar kWh sales and unbilled kWh sales are now calculated in a separate weather normalization model for the 2016 Annual update.

- Class models in the 2016 Annual update are the same as the 2015 Triennial filing: residential, small commercial (small general service commercial), big commercial (medium general service commercial, large general service commercial, and large power commercial), and industrial (small general service industrial, medium general service industrial, large general service industrial, and large power industrial).
- The Company also reevaluated the output elasticities used in the commercial and industrial models and the elasticity used in the residential model. Adjustment made were to increase the R^2 .

The load forecast is shown in Table 5 below:

Table 5: GMO Mid-Case Annual Forecast ** Highly Confidential **



Note: 2002-2015 Gross Peak data has been weather-normalized

SECTION 3: SUPPLY-SIDE RESOURCE ANALYSIS UPDATE

3.1 FUEL AND EMISSION FORECAST CHANGES FROM THE 2015 TRIENNIAL IRP

The forecasts for coal, natural gas, fuel oil, SO₂, NO_x, NO_x Seasonal, and CO₂ have been updated for the 2016 Annual Update filing. Note that the methodology used in determining the forecast range has not changed from the 2015 Triennial IRP. The data is presented in graphical and tabular form on the next pages.

Table 6: Coal Forecasts - 2015 IRP Vs. 2016 Annual Update Graphic Highly Confidential ****

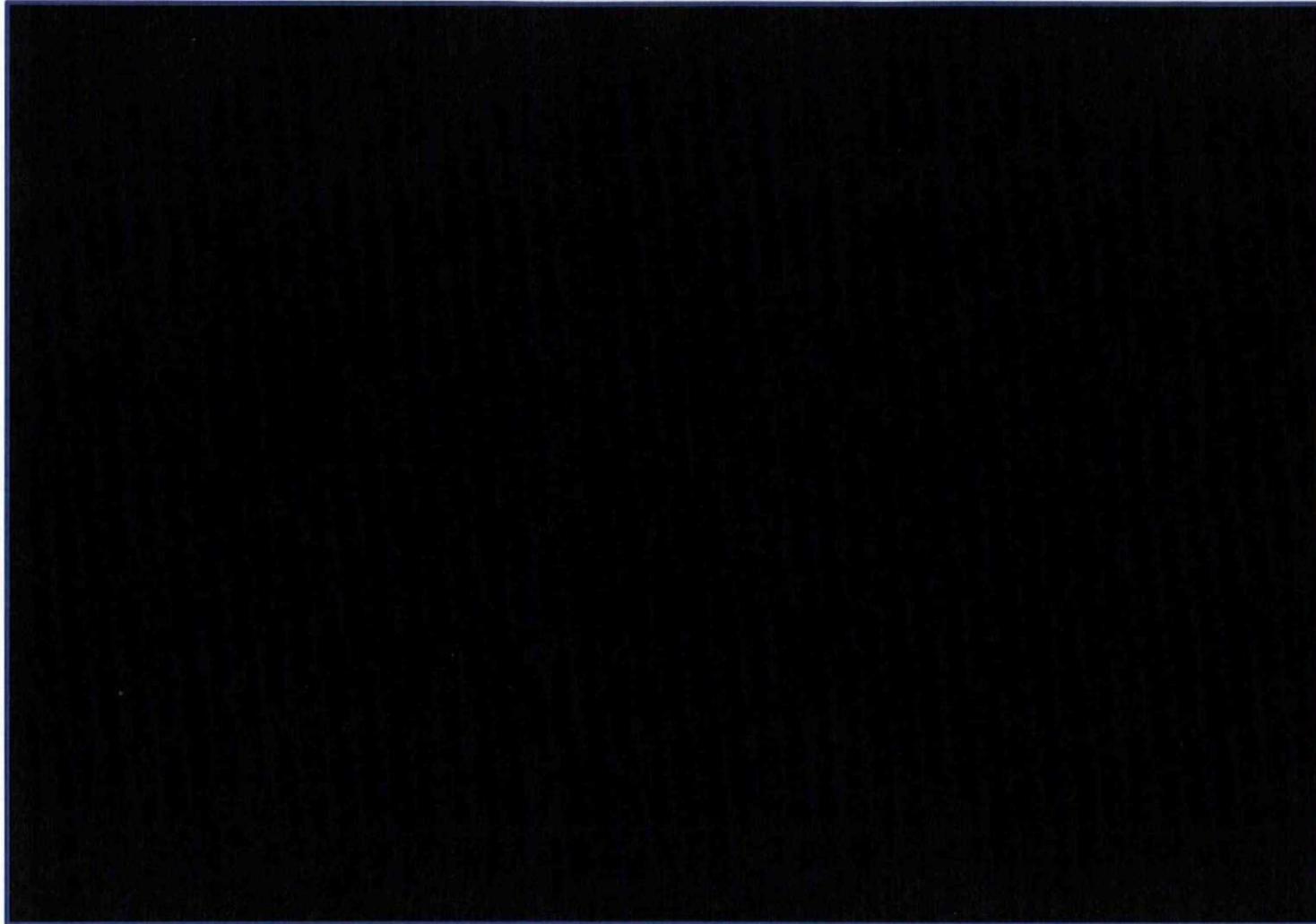


Table 7: Coal Forecasts - 2015 IRP Vs. 2016 Annual Update ** Highly Confidential **

Coal Forecast	
2015 IRP: Mid	
2015 IRP: High	
2015 IRP: Low	
Coal Forecast	
2015 IRP: Mid	
2015 IRP: High	
2015 IRP: Low	
Coal Forecast	
2016 IRP: Mid	
2016 IRP: High	
2016 IRP: Low	
Coal Forecast	
2016 IRP: Mid	
2016 IRP: High	
2016 IRP: Low	

Table 8: Natural Gas Forecasts - 2015 IRP Vs. 2016 Annual Update Graphic ** Highly Confidential **

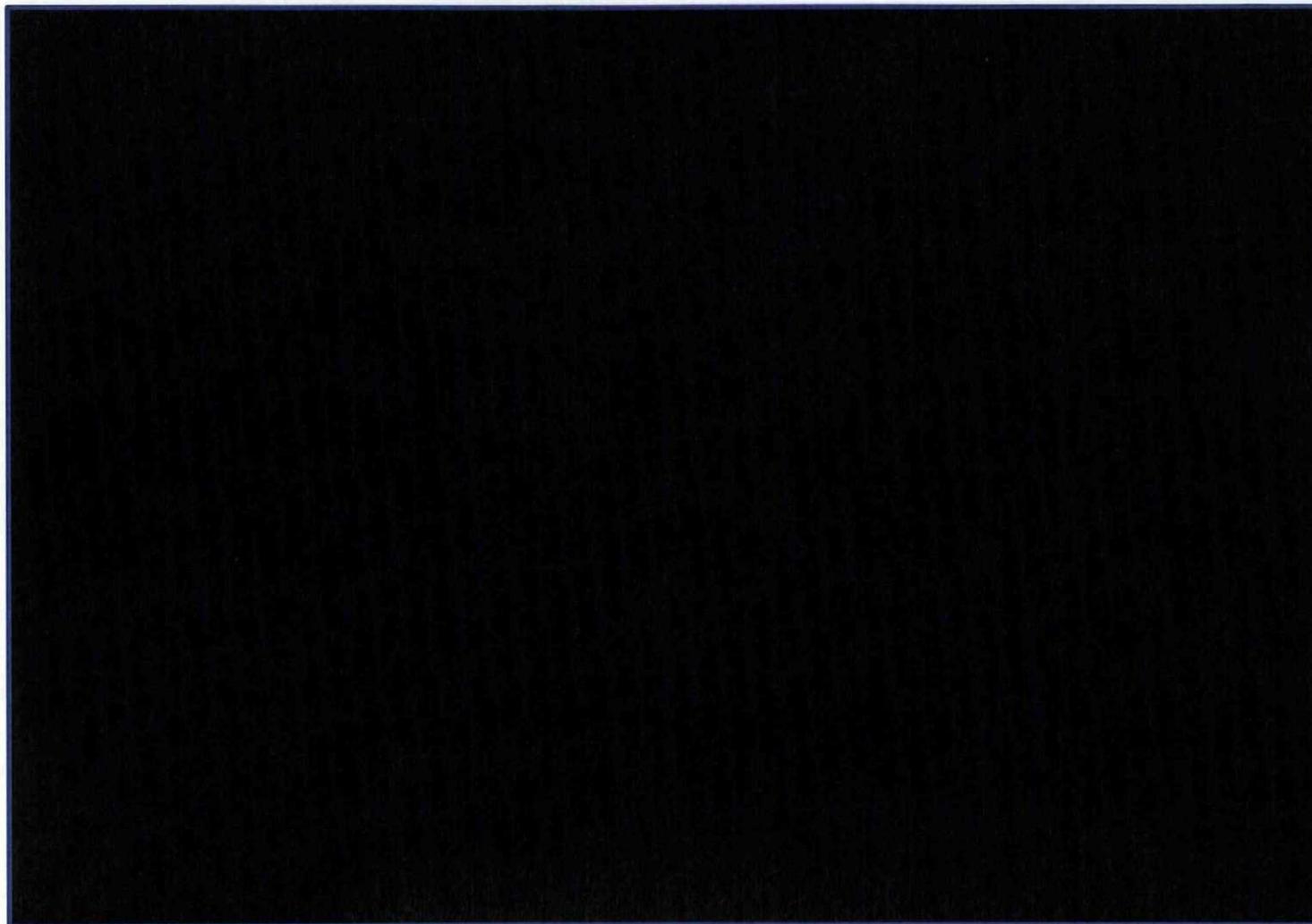


Table 9: Natural Gas Forecasts - 2015 IRP Vs. 2016 Annual Update ** Highly Confidential **

Natural Gas Forecast	
2015 IRP: Mid	
2015 IRP: High	
2015 IRP: Low	
Natural Gas Forecast	
2015 IRP: Mid	
2015 IRP: High	
2015 IRP: Low	
Natural Gas Forecast	
2016 IRP: Mid	
2016 IRP: High	
2016 IRP: Low	
Natural Gas Forecast	
2016 IRP: Mid	
2016 IRP: High	
2016 IRP: Low	

Table 10: Fuel Oil Forecasts - 2015 IRP Vs. 2016 Annual Update Graphic ** Highly Confidential **

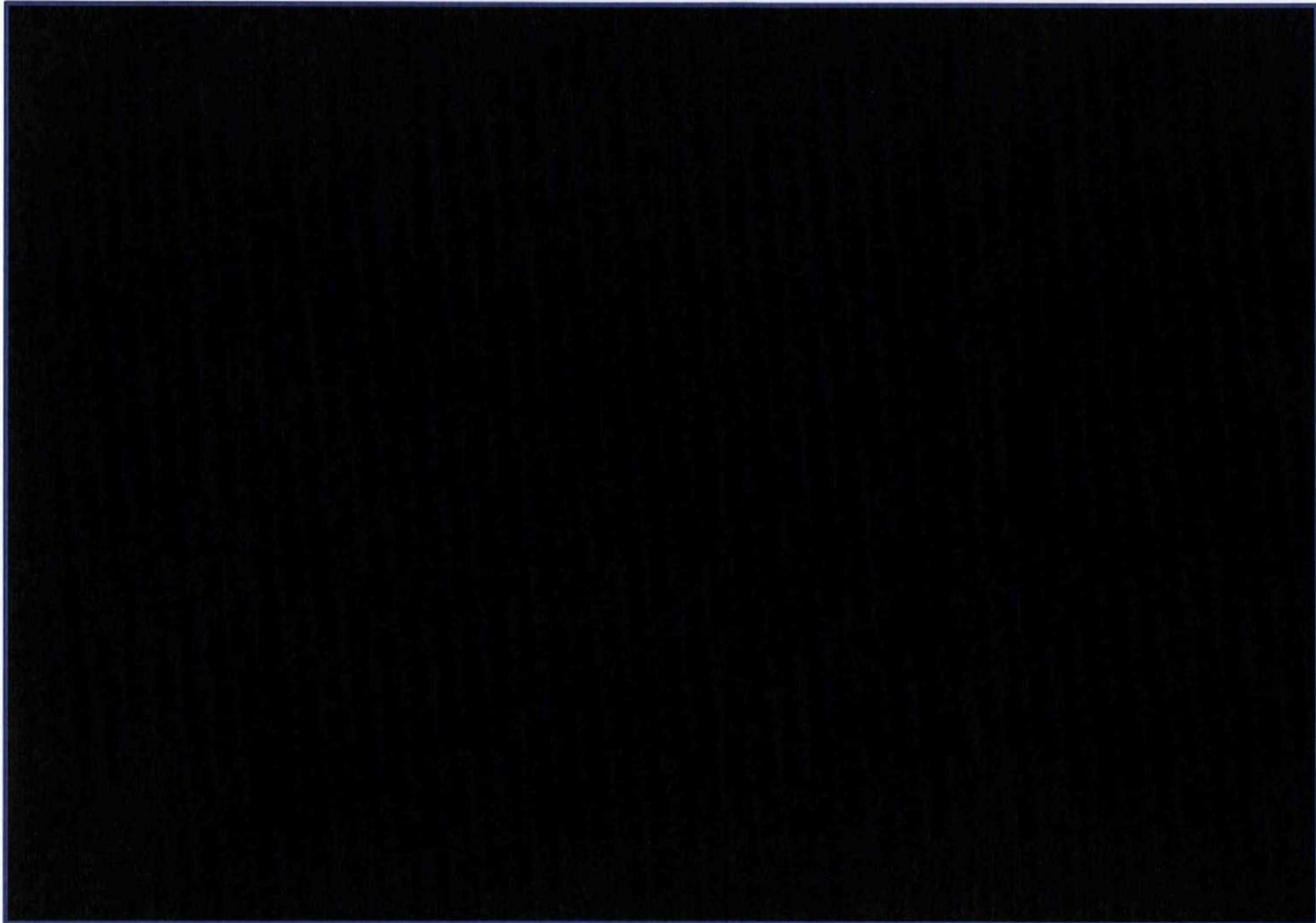


Table 11: Fuel Oil Forecasts - 2015 IRP Vs. 2016 Annual Update ** Highly Confidential **

Fuel Oil Forecast	
2015 IRP: Mid	
2015 IRP: High	
2015 IRP: Low	
Fuel Oil Forecast	
2015 IRP: Mid	
2015 IRP: High	
2015 IRP: Low	
Fuel Oil Forecast	
2016 IRP: Mid	
2016 IRP: High	
2016 IRP: Low	
Fuel Oil Forecast	
2016 IRP: Mid	
2016 IRP: High	
2016 IRP: Low	

Table 12: SO₂ Forecasts - 2015 IRP Vs. 2016 Annual Update Graphic ** Highly Confidential **



Table 13: SO₂ Forecasts - 2015 IRP Vs. 2016 Annual Update ** Highly Confidential **

SO ₂ Group 1 Forecast										
2015 IRP: Mid										
2015 IRP: High										
2015 IRP: Low										
SO ₂ Group 1 Forecast										
2015 IRP: Mid										
2015 IRP: High										
2015 IRP: Low										
SO ₂ Group 1 Forecast										
2016 IRP: Mid										
2016 IRP: High										
2016 IRP: Low										
SO ₂ Group 1 Forecast										
2016 IRP: Mid										
2016 IRP: High										
2016 IRP: Low	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 14: NO_x Annual Forecasts - 2015 IRP Vs. 2016 Annual Update Graphic ** Highly Confidential **

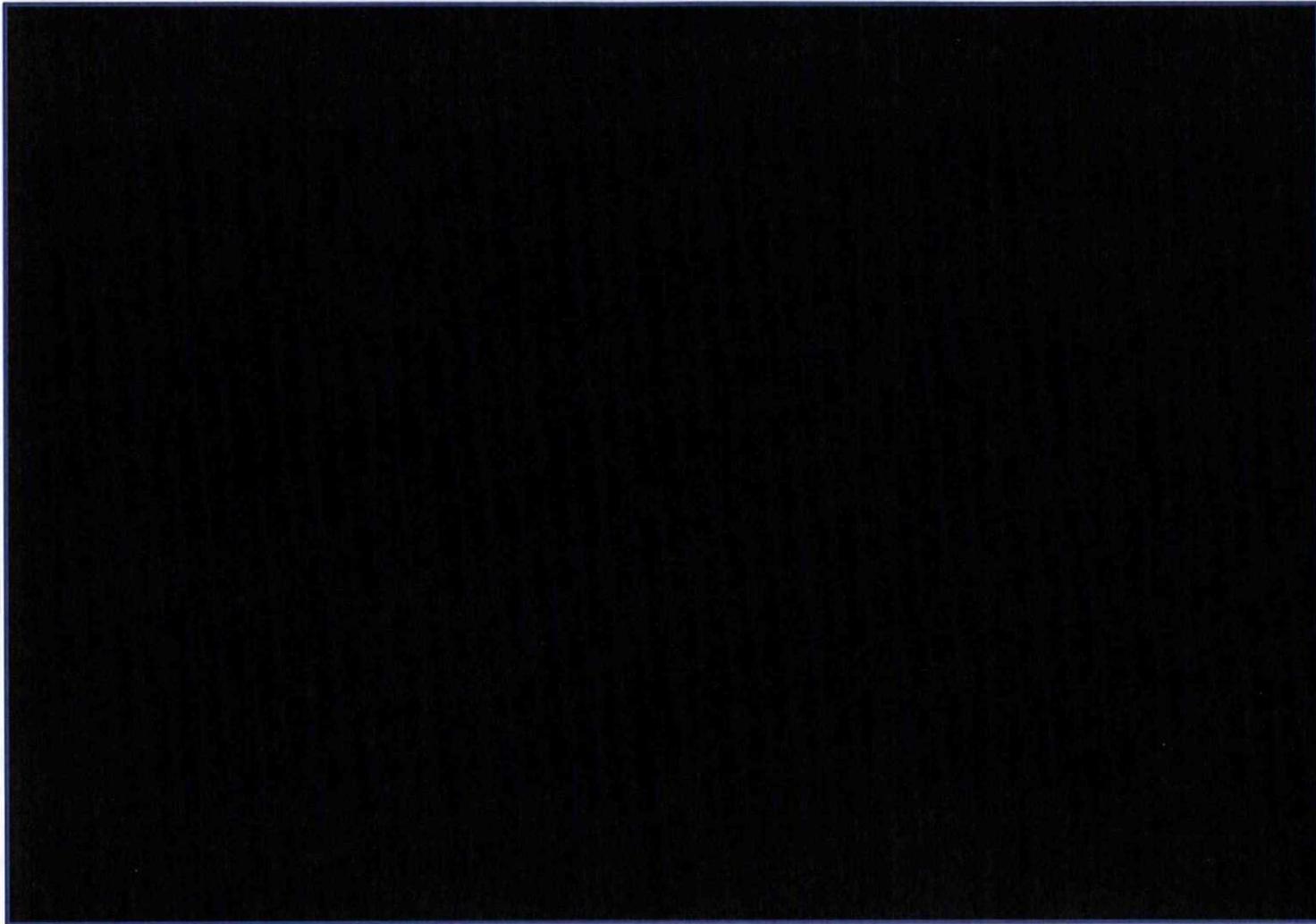


Table 15: NO_x Annual Forecasts - 2015 IRP Vs. 2016 Annual Update ** Highly Confidential **

NO _x Annual Forecast	[Redacted]
2015 IRP: Mid	
2015 IRP: High	
2015 IRP: Low	
NO _x Annual Forecast	
2015 IRP: Mid	
2015 IRP: High	
2015 IRP: Low	
NO _x Annual Forecast	
2016 IRP: Mid	
2016 IRP: High	
2016 IRP: Low	
NO _x Annual Forecast	
2016 IRP: Mid	
2016 IRP: High	
2016 IRP: Low	

Table 16: NO. Seasonal Forecasts - 2015 IRP Vs. 2016 Annual Update Graphic Highly Confidential ****

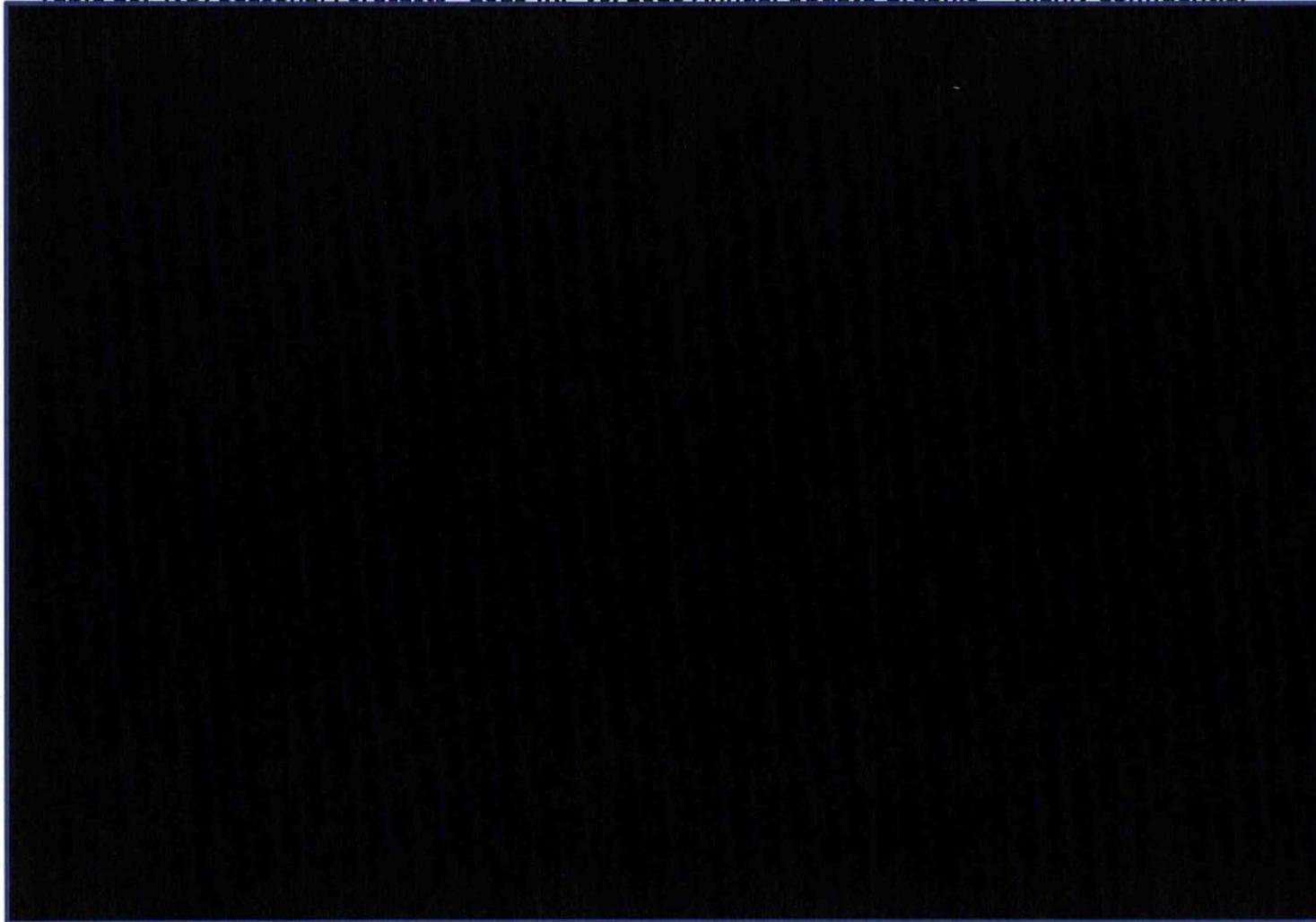


Table 17: NO_x Seasonal Forecasts - 2015 IRP Vs. 2016 Annual Update ** Highly Confidential **

NO _x Seasonal Forecast	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
2015 IRP: Mid										
2015 IRP: High										
2015 IRP: Low										
NO _x Seasonal Forecast										
2015 IRP: Mid										
2015 IRP: High										
2015 IRP: Low										
NO _x Seasonal Forecast										
2016 IRP: Mid										
2016 IRP: High										
2016 IRP: Low										
NO _x Seasonal Forecast										
2016 IRP: Mid										
2016 IRP: High										
2016 IRP: Low										

Table 18: CO₂ Forecast - 2015 IRP Vs. 2016 Annual Update Graphic ** Highly Confidential **

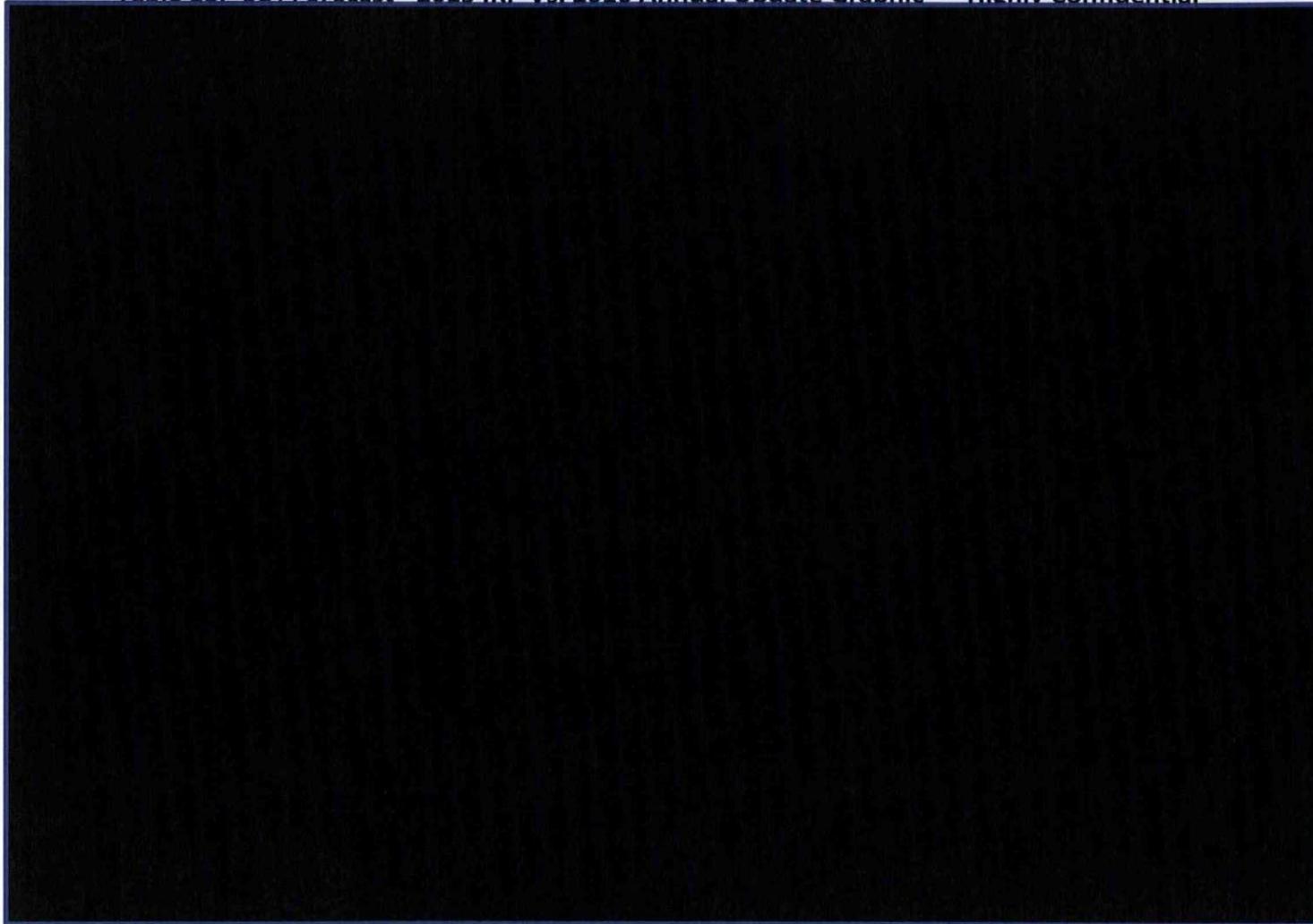
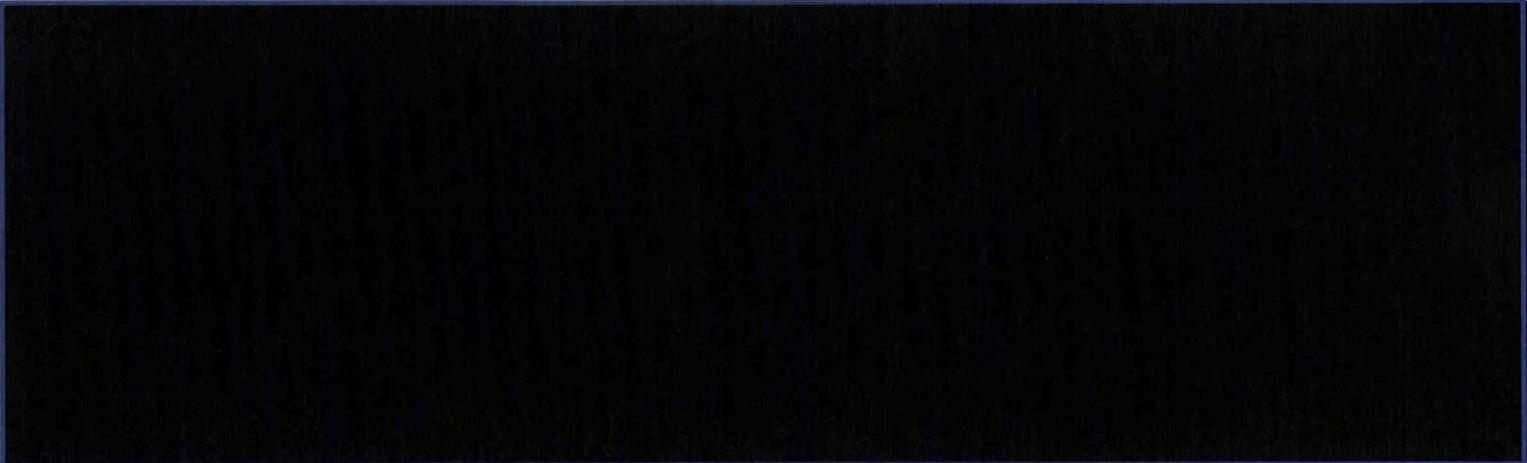


Table 19: CO₂ Forecast - 2016 Annual Update ** Highly Confidential **

CO ₂ Forecast	
2015 IRP: Yes	
2015 IRP: No	
CO ₂ Forecast	
2015 IRP: Yes	
2015 IRP: No	
CO ₂ Forecast	
2016 IRP: Yes	
2016 IRP: No	
CO ₂ Forecast	
2016 IRP: Yes	
2016 IRP: No	

The following two tables provide the sources of the fuel and emission forecasts reflected in the above charts.

Table 20: Fuel Forecast Sources

Forecast Source	Coal	Natural Gas	Fuel Oil
IHS	x	x	x
EIA	x	x	x
PIRA		x	x
Energy Ventures Analysis	x	x	x
Wood Mac			
JD Energy	x		
Synapse			
SNL Financial			
Hanou Energy Consulting	x		

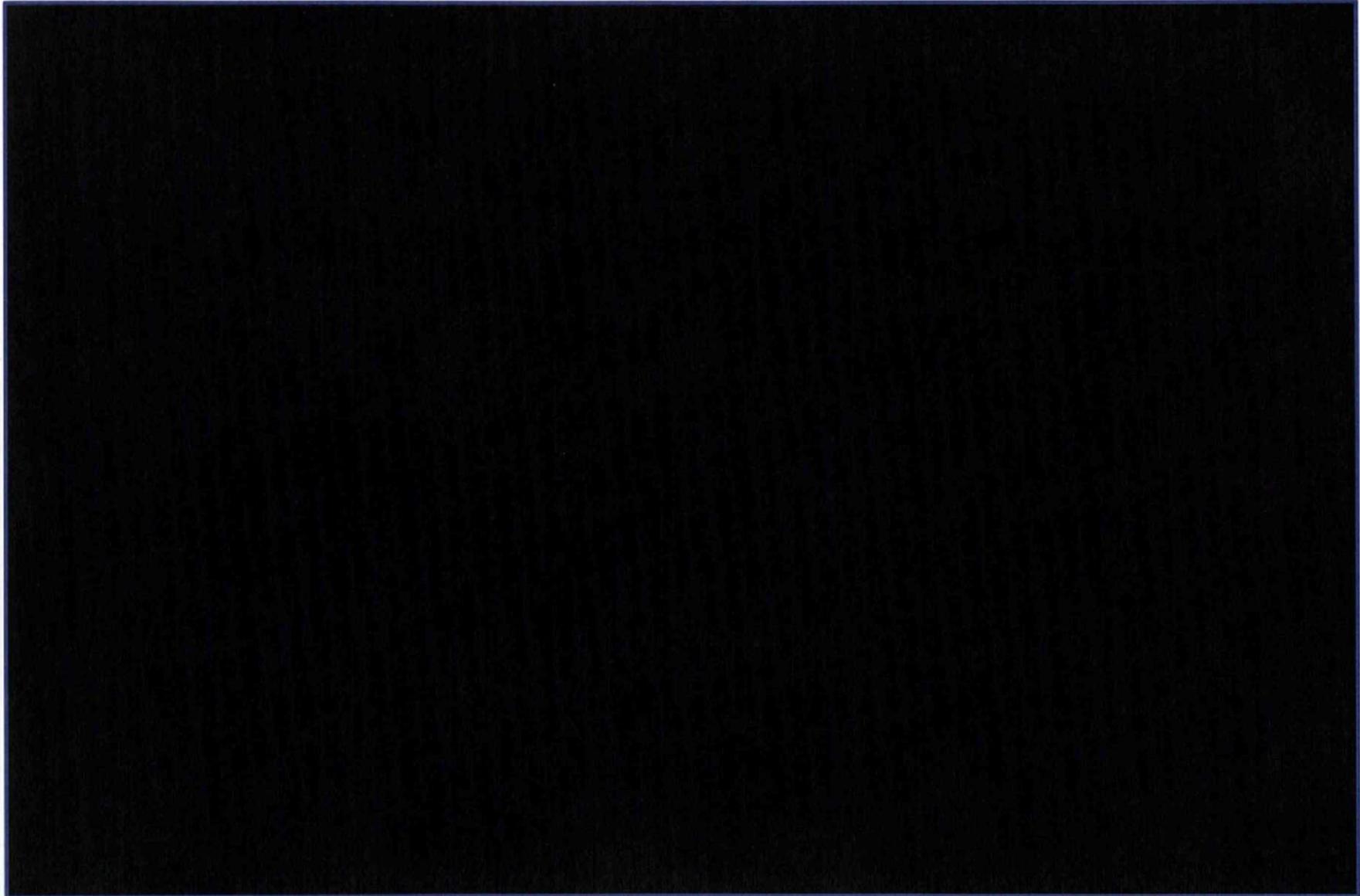
Table 21: Emission Forecast Sources

Forecast Source	SO ₂	NO _x	CO ₂
IHS	x	x	x
EIA			
PIRA			
Energy Ventures Analysis	x	x	x
Wood Mac			
JD Energy	x	x	x
Synapse			x
SNL Financial			
Hanou Energy Consulting			

3.1.1 SUPPLY-SIDE TECHNOLOGY CANDIDATE RESOURCE OPTIONS

Supply-side technology candidates reviewed for potential integrated resource analysis in the 2016 Annual Update are shown in Table 22 below. The cost and operating data sources for these technologies were obtained from Electric Power Research Institute Technical Assessment Guide (EPRI-TAG®), the Energy Information Administration, and recently obtained market intelligence. These supply-side options include natural gas, coal, nuclear and renewable alternatives. The following table compares the all-in cost of the supply side options on a 2016 dollar per MWh basis which includes capital cost, fixed O&M, variable O&M, fuel, and emissions.

Table 22: Supply-Side Technology Candidates ** Highly Confidential **



3.1.2 LIFE ASSESSMENT & MANAGEMENT PROGRAM

The 2016 Annual Update included an update of the Life Assessment and Management Program (LAMP) data for the GMO coal-fired generating units.

SECTION 4: TRANSMISSION AND DISTRIBUTION UPDATE

4.1 CHANGES FROM THE 2015 TRIENNIAL IRP

4.2 RTO EXPANSION PLANNING

GMO assessment of RTO expansion plans is an ongoing process that occurs throughout the various regional planning processes conducted by SPP. These assessments include review and approval of plan scope documents, review and approval of plan input assumptions, review of plan study analysis and results with feedback from GMO staff, and review and approval of final plan reports. All transmission projects for the GMO service territory are included in SPP's annual Transmission Expansion Plan Report and Project List. By meeting the performance standards established for transmission planning the assessment ensures that adequate transmission is available in the near term and long term to meet the firm load and transmission service requirements included in the SPP Regional Plan for GMO. These documents are attached as Appendix A 2016 SPP Transmission Expansion Plan Report.pdf and Appendix A1 2016 SPP Transmission Expansion Plan Project List.xls.

4.3 ADVANCED DISTRIBUTION TECHNOLOGIES DISCUSSION

Having completed the SmartGrid Demonstration project in 2015, the company is has implemented and is planning more targeted Advanced Distribution Technologies (ADT).

Main items on the near-term ADT plan include:

- Implementing SCADA-like monitoring and control into the Company's recently implemented Operations Management System (OMS).
- Fault Isolation and System Restoration (FISR) pilots for proof of concept.
- Fault Location functionality with the new OMS system.
- Pilots and proof of concept for Communicating Faulted Circuit Indicators (CFCI).
- Replace "2G" vintage distribution end-device cellular communications equipment.
- Pilot new "4G" distribution end-point communications equipment.
- Develop a multi-year Distribution Automation Roadmap.

4.3.1 SCADA-LIKE MONITORING AND CONTROL VIA OMS

The company has over ten years of experience using cellular communications for monitoring, operating, controlling and maintaining Intelligent End Devices (IEDs) on the distribution system. Up through mid-2015, this technology has been limited to internet-based web applications. This required company distribution dispatchers to utilize a separate system to operate this communicating equipment. This added complexity to the dispatcher role and there was a desire to consolidate as much functionality as possible into the new OMS system. Phase 2 of the Company's OMS implementation project included integration of the internet-based system directly into the OMS. This project was placed in service in 2015.

Distribution dispatchers now monitor and operate the communicating IEDs directly from the OMS system without the need to swap between systems with very different interfaces. The internet-based web applications still underlie the OMS integration, providing an emergency back-up system to operate this equipment in the event of issues with the OMS system.

Engineering and other non-dispatch organizations mainly utilize the web applications to manage and maintain the fleet of communicating IEDs in the field.

4.3.2 FAULT ISOLATION AND SERVICE RESTORATION (FISR)

The company plans to pilot two schemes for FISR: one using peer-to-peer communications between smart switching devices and a second one with a loop scheme (without peer-to-peer communications).

4.3.2.1 FISR Using Peer-to-Peer (PTP) Communications

The company is planning two initial pilots (Phase 1) for FISR with PTP communications for proof of concept. One is targeted for the Lee's Summit area within GMO and the second is in the Roeland Park area within KCPL-KS. A second phase of pilots is planned on the heels of the first two, but locations have not been selected as this point.

The switching devices chosen for this pilot are S&C Electric's Intellirupter Pulseclosers. PTP is a term meaning that there is specific communications between the switches on the feeder so these intelligent devices share information before performing any automated switching operations. The PTP communications will be provided by S&C Electric's Speednet radio system. The intelligent switching and restoration in this scheme is managed by S&C Electric's Intelliteam distributed control system embedded into the switching device controls.

In essence, switches will be placed at middle points on adjacent circuits as well as the normally open switch points between these circuits. This is similar to historical system design where field personnel are dispatched to patrol the circuit and manually operate the switches

to isolate a faulted section as well as using the tie switch to restore circuit sections not directly affected by the fault.

In the FISR pilot, the Intelliteam system and the PTP communications will automatically identify a faulted circuit section (without requiring a human patrol), perform switching to isolate the faulted section and perform switching to restore sections not affected by the fault. The Company anticipates this will all occur in less than five (5) minutes and involves little to no human intervention.

After the automated switching is completed, the Intelliteam system will communicate the results via cellular communications to Company operators informing them of the faulted section and the restoration switching already performed. Dispatchers will then have information to dispatch crews directly to the faulted section to identify the physical problem and make repairs. Field crews will not need to patrol non-faulted sections, reducing patrol times.

After repairs are completed, dispatchers can remotely switch the system back to its normal configuration without requiring a field crew to perform the switching.

If the Company finds the initial two pilots (Phase 1) successful over an estimated nine month period, the next set of circuits will be piloted (Phase 2). After this second phase of pilot circuits is observed, the Company will complete a study of the performance and make recommendations whether to proceed with this scheme as a standard solution and establish criteria for its application.

4.3.2.2 FISR Using Loop Scheme

The company is planning two initial pilots (Phase 1) for FISR using a Loop Scheme for proof of concept. Locations have not been selected as yet, but the Company will plan at least one for GMO as well as KCPL-MO.

The switching devices chosen for this pilot are G&W Electric's Viper Recloser using a Sweitzer Engineering Labs control. A Loop Scheme is based on conditions measured at each intelligent switch as well as coordinated timing between the switches. PTP is not required for Loop Scheme. Each individual switch will communicate via cellular communications back to the Company's OMS. This is also a distributed intelligence system since switching decisions are made locally by the switches, not by a centralized control system (such as a Distribution Management System).

In essence, switches will be placed at middle points on adjacent circuits as well as the normally open switch points between these circuits. This is similar to historical system design where field personnel are dispatched to patrol the circuit and manually operate the switches to isolate a faulted section as well as using the tie switch to restore circuit sections not directly affected by the fault.

In the Loop Scheme FISR pilot, each switch will sense fault current and voltage conditions, while allowing sufficient time for upstream equipment to complete an operational sequence. Using this local data/sensing, switches decide to open or close in order to automatically isolate a faulted circuit section (without requiring a human patrol), and perform switching to restore sections not affected by the fault. The Company anticipates this will all occur in less than ten (10) minutes (and possibly less than five minutes) and involves little or no human intervention.

After the automated switching is completed, the each switch will communicate the results via cellular communications to Company OMS informing dispatchers of the faulted section and the restoration switching already performed. Dispatchers will then have information to dispatch crews directly to the faulted section to identify the physical problem and make repairs. Field crews will not need to patrol non-faulted sections, reducing patrol times.

After repairs are completed, dispatchers can remotely switch the system back to its normal configuration without requiring a field crew to perform the switching.

If the Company finds the initial pilots successful, another set of circuits will be piloted (Phase 2). After this second phase of pilot circuits is observed, the Company will complete a study of the performance and make recommendations whether to proceed with this scheme as a standard solution and establish criteria for its application.

4.3.3 OMS FAULT LOCATION FUNCTIONALITY

The supplier of the Company's new OMS system claims it has an advanced application for predicting Fault Location. The concept is fairly simple in nature. The OMS will use data from communicating field equipment to predict sections of a feeder where a fault may be physically located. The more fault sensors (such as communicating faulted circuit indicators, or communicating switches) on the circuit, the more accurately the OMS will be able to predict the fault location.

Benefits anticipated from Fault Location prediction are mainly reduced patrol time for field crews. Dispatchers can direct field crews to focus on predicted faulted sections vs. patrolling an entire circuit to identify a fault.

If this proves to be highly accurate, communicating switches could be added to circuits to enable dispatchers to isolate the faulted section before a field patrol is completed as well as restoring as many customers as possible via remote switching. This would in essence be a human-supervised form of FISR.

No specific timeline has been established to pilot and study this function.

4.3.4 COMMUNICATING FAULTED CIRCUIT INDICATOR (CFCI) PILOTS

The company is working with suppliers to pilot current technologies for CFCIs. The usefulness of CFCIs to Company dispatchers has escalated due to the new functionality discussed previously in the "SCADA-like Monitoring and Control in OMS" section.

Dispatchers will now have the ability to receive alarms in OMS and to "see" the CFCI indication on the OMS's One-line diagram while troubleshooting an outage within OMS. This will greatly

enhance the “visibility” and usefulness of CFCIs to dispatchers, vs. having to go to a web application as in the past.

CFCIs are also anticipated to be a cost-effective way to enhance the OMS Fault Location functionality discussed previously. Although CFCIs cannot perform switching operations, they can enhance the effectiveness of dispatching and manual switching.

Specific pilot locations have not been selected yet, but will include both GMO and KCPL-MO locations.

4.3.5 2G CELLULAR COMMUNICATIONS REPLACEMENT

The company has cellular-based communications to field devices that utilize AT&T 2G generation communications. AT&T plans to retire its 2G network in 2016, so the Company has a plan to replace 2G endpoints with 3G cellular or private cellular. This replacement is ongoing and planned to complete in 2016.

4.3.6 4G CELLULAR COMMUNICATIONS PILOT

The Company’s cellular communications provider recently introduced a series of endpoint devices using “4G” cellular communications. The Company has begun bench testing this equipment and plans to pilot this equipment in the field in 2016.

The pilot will also include integration into the OMS platform.

Pilot locations have not been selected yet, but will include both GMO and KCPL-MO locations.

4.3.7 DEVELOP A MULTIYEAR DISTRIBUTION AUTOMATION ROADMAP

The Company plans to develop a framework for a multiyear Distribution Automation Roadmap and prepare a first iteration of the Roadmap in 2016. The roadmap will include aspects across the entire company, including GMO, KCPL-MO and KCPL-KS.

SECTION 5: DEMAND-SIDE RESOURCE ANALYSIS UPDATE

5.1 MEEIA CYCLE 2 2016-2018 PROGRAMS

Since the 2015 Triennial IRP filing GMO has filed an application to implement its second MEEIA plan (MEEIA cycle 2) for GMO. After extensive review with numerous parties, the Company made numerous modifications to the plan to address many of the suggestions and recommendations made by the parties. As a result, the Company was able to reach a non-unanimous stipulation and agreement, and on March 2, 2016 the Commission issued an Order approving the stipulation and agreement.

Table 23 below shows the budgets and annual energy and demand savings targets for each MEEIA program for the 36-month cycle period. The 36-month cycle is expected to begin on April 1, 2016 and would conclude on March 31, 2019.

Table 23: GMO - MEEIA 36 Month Plan Period**Highly Confidential**

Programs	Budget	kWh	kW
Business Energy Efficiency Rebate - Standard		38,710,762	6,385
Business Energy Efficiency Rebate - Custom		30,079,932	7,758
Strategic Energy Management		12,127,508	2,842
Block Bidding		17,603,947	3,052
Small Business Direct Install		3,569,963	592
Business Programmable Thermostat		79,002	215
Demand Response Incentive		-	55,000
Online Business Energy Audit		-	-
Home Lighting Rebate		25,288,145	2,558
Home Appliance Recycling Rebate		8,105,510	1,352
Home Energy Report		21,070,772	4,215
Income-Eligible Home Energy Report		-	-
Whole House Efficiency		11,612,236	3,720
Income-Eligible Multi-Family		10,014,278	1,357
Income-Eligible Weatherization		143,458	53
Residential Programmable Thermostat		6,144,138	16,757
Online Home Energy Audit		-	-
Total Commercial		102,171,115	75,844
Total Residential		82,378,537	30,011
Research & Pilot		-	-
General Administration		-	-
Total		184,549,652	105,855

It should also be noted that GMO is exploring a behind-the-meter demand response (DR) system as a pilot project. The DR system, Innovari, enables two-way, real time communication and load control between the utility and customers.

5.2 CHANGES FROM THE 2015 TRIENNIAL IRP

DSM Option C for the 2016 Annual Update updates the 2015 Triennial preferred plan to reflect the MEEIA cycle 2 plan. Thus, the annual incremental energy and demand impacts for the period through March 31, 2019 for Option C were updated. Note that there are no program impacts for the 3-month period from January 1, 2016 through March 31, 2016. Beginning April 1, 2019, the incremental annual energy and demand impacts are the same as the preferred plan adopted in the 2015 Triennial IRP.

Since the 2015 Triennial preferred plan transitioned to RAP incremental energy and demand impacts after the first 3 years, the current Option C also reflects RAP incremental energy and demand impacts after the MEEIA cycle 2 program period. Consequently, Option C also represents the RAP scenario and no additional RAP scenario is needed. Table 24 shows the revised annual cumulative energy and demand impacts for Option C / RAP. The MAP scenario is unchanged from the 2015 Triennial filing.

Table 24: GMO Option C / RAP

Year	MW	MWh
2016	26.5	23,645
2017	62.5	82,499
2018	93.3	138,057
2019	127.0	231,265
2020	178.7	330,151
2021	231.2	439,673
2022	285.1	556,797
2023	338.2	675,157
2024	389.7	780,289
2025	413.4	877,696
2026	435.0	968,437
2027	455.6	1,045,138
2028	475.4	1,115,733
2029	493.9	1,169,083
2030	509.9	1,209,844
2031	524.7	1,241,734
2032	539.3	1,265,104
2033	552.9	1,283,973
2034	566.4	1,301,830

SECTION 6: INTEGRATED RESOURCE PLAN AND RISK ANALYSIS UPDATE

6.1 CHANGES FROM THE 2015 TRIENNIAL IRP

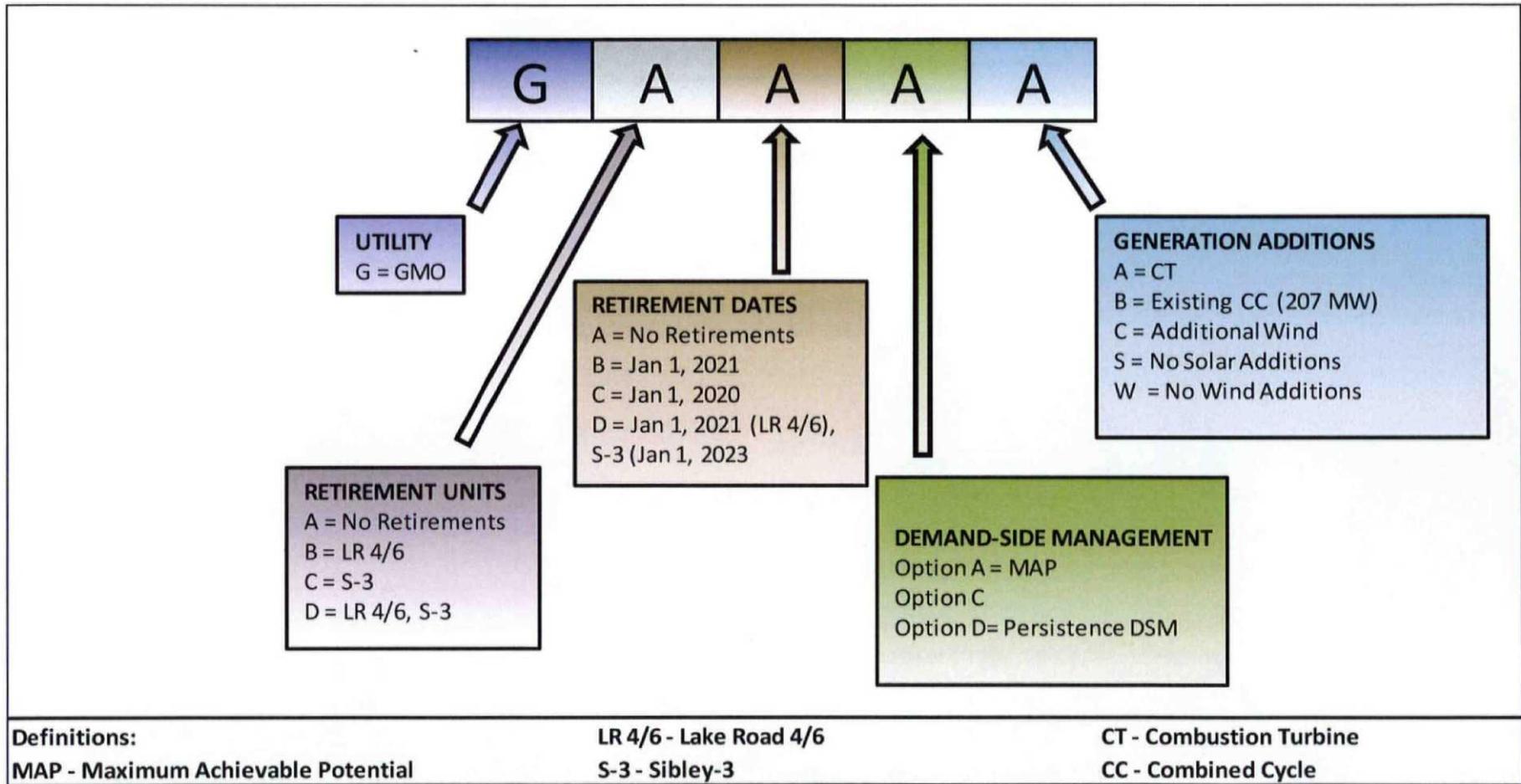
Since the filing of the 2015 Triennial IRP, changing conditions, or major drivers, were refreshed to reflect the latest information and forecasts available to determine if the Preferred Plan and associated Resource Acquisition Strategy identified in 2015 Triennial IRP continue to be the company's path forward. The information and forecasts that have been updated for the 2016 Annual Update included:

- Proposed and Potential Environmental Regulations
- Load Forecast Projections
- Demand-Side Management Program levels

6.2 ALTERNATIVE RESOURCE PLAN NAMING CONVENTION

Alternative Resource Plans (ARP) were developed using a combination of supply-side resources, demand-side resources, various resource addition timings, as well as generation retirement options and timings. Because some of the supply-side technology candidates were either considerably more costly in comparison to other technologies considered and/or permitting is currently expected to be extremely difficult to achieve, only a portion of the candidates were utilized in development of APRs. The naming convention utilized for the ARPs developed for the 2016 Annual Update is shown in Table 25 and an overview of the ARPs is provided in Table 26 and Table 27 below. :

Table 25: Alternative Resource Plan Naming Convention



Note: All Alternative Resource Plans include Sibley Units 1-2 no longer burning coal by 2020.

Table 26: Alternative Resource Plan Overview

Plan Name	DSM Level	Cease Burning Coal	Year to Cease Burning Coal	Renewable Additions		Generation Addition (if needed)
GAAAA	Option A - MAP	Sibley-1 Sibley-2	2019	Solar: 2016 - 5 MW 2026 - 5 MW	Wind: 2017 - 260 MW	n/n
GAACA	Option C	Sibley-1 Sibley-2	2019	Solar: 2016 - 5 MW 2026 - 5 MW	Wind: 2017 - 260 MW	n/n
GAACB	Option C	Sibley-1 Sibley-2	2019	Solar: 2016 - 5 MW 2026 - 5 MW	Wind: 2017 - 260 MW	Add 207 MW Existing CC in 2017
GAACC	Option C	Sibley-1 Sibley-2	2019	Solar: 2016 - 5 MW 2026 - 5 MW	Wind: 2017 - 260 MW	Add 200 MW Wind in 2020
GBBCA	Option C	Sibley-1 Sibley-2	2019	Solar: 2016 - 5 MW 2026 - 5 MW	Wind: 2017 - 260 MW	n/n
		Lake Road 4/6	2023 (convert to NG in 2016)			
GBBCB	Option C	Sibley-1 Sibley-2	2019	Solar: 2016 - 5 MW 2026 - 5 MW	Wind: 2017 - 260 MW	Add 207 MW Existing CC in 2017
		Lake Road 4/6	2021 (convert to NG in 2016)			

n/n - None needed

Table 27: Alternative Resource Plan Overview (continued)

Plan Name	DSM Level	Cease Burning Coal	Year to Cease Burning Coal	Renewable Additions		Generation Addition (if needed)
GCBCA	Option C	Sibley-1 Sibley-2	2019	Solar: 2016 - 5 MW 2026 - 5 MW	Wind: 2017 - 260 MW	207 MW CT in 2023
		Sibley-3	2023			
GCBCB	Option C	Sibley-1 Sibley-2	2019	Solar: 2016 - 5 MW 2026 - 5 MW	Wind: 2017 - 260 MW	Add 207 MW Existing CC in 2017
		Sibley-3	2023			
GCCCA	Option C	Sibley-1 Sibley-2	2019	Solar: 2016 - 5 MW 2026 - 5 MW	Wind: 2017 - 260 MW	621 MW CT in 2020
		Sibley-3	2020			
GDDCA	Option C	Sibley-1 Sibley-2	2019	Solar: 2016 - 5 MW 2026 - 5 MW	Wind: 2017 - 260 MW	414 MW CT in 2023
		Lake Road 4/6	2021 (convert to NG in 2016)			
		Sibley-3	2023			
GAADA	Option D - Persistence	Sibley-1 Sibley-2	2019	Solar: 2016 - 5 MW 2026 - 5 MW	Wind: 2017 - 260 MW	414 MW CT in 2019
GBBCS	Option C	Sibley-1 Sibley-2	2019	No Solar Adds	Wind: 2017 - 260 MW	n/n
		Lake Road 4/6	2021 (convert to NG in 2016)			
GBBCW	Option C	Sibley-1 Sibley-2	2019	Solar: 2016 - 5 MW 2026 - 5 MW	No Wind Adds	n/n
		Lake Road 4/6	2021 (convert to NG in 2016)			

n/n - None needed

Refer to Appendix B, Capacity Balance Spreadsheets HC, for tables which provide the GMO forecast of capacity balance over the twenty-year planning period for each of the Alternative Resource Plans outlined above. These capacity forecasts include renewable and traditional generation additions. The capacity for wind facilities is based on SPP's criteria for calculating wind net capability using actual generation or wind data. Solar capacity is based on SPP criteria indicating that absent a net capability calculation, 10% of the facility's nameplate rating be used.

6.3 REVENUE REQUIREMENT

For each of the Alternative Resource Plans developed, integrated analysis yielded an expected value of the Net Present Value of Revenue Requirement shown in Table 28 below.

Table 28: Twenty-Year Net Present Value Revenue Requirement

Rank (L-H)	Plan	NPVRR (\$mm)	Delta
1	GBBCS	10,382	0
2	GBBCA	10,389	6
3	GAACA	10,447	65
4	GAACC	10,511	129
5	GCBCA	10,524	141
6	GBBCW	10,529	146
7	GDDCA	10,629	246
8	GCBCB	10,660	278
9	GAADA	10,688	306
10	GBBCB	10,698	316
11	GAACB	10,756	374
12	GCCCA	10,947	565
13	GAAAA	11,476	1,094