Schumaker & Company

Management/Performance and Financial Audit of the Fuel and Purchased Power and System Reliability Tracker Riders of Duke Energy Ohio, Inc.

For the

Public Utilities Commission of Ohio

Case No. 11-974-EL-FAC

Case No. 11-975-EL-RDR

Public Version

May 2012

Table of Contents

Table of Contents (continued)

Table of Contents
(continued)

Table of Exhibits

Table of Exhibits
(continued)

Table of Exhibits (continued)

Table of Exhibits (continued)

Table of Exhibits
(continued)

Table of Exhibits
(continued)

Table of Findings

Table of Findings
(continued)

Table of Findings (continued)

Table of Findings (continued)

Table of Findings (continued)

Table of Recommendations

I. Introduction

Schumaker & Company was hired by the Public Utilities Commission of Ohio (PUCO or Commission) to conduct a management/performance and financial audit of the fuel/purchased power and system reliability tracker riders of Duke Energy Ohio, Inc. (Duke Energy Ohio). Specifically, Schumaker & Company was selected to conduct an audit of the company's fuel costs (including any renewable energy costs) as well as its system reliability costs. This audit covered the time period of January 1, 2011 through December 31, 2011.

This audit was conducted in accordance with the standards set forth in the Generally Accepted Auditing Standards (GAAS) – as contained in the U.S. General Accounting Office's standards related to issues of management economy, efficiency, and effectiveness as applicable to public utilities (the "Yellow Book"). It was also performed in accordance with the standards defined in the request for proposal and set forth in the National Association of Regulatory Utility Commissioners' "Consultant Standards and Ethics for Performance of Management Analysis," dated November 15, 1989. Schumaker & Company's working paper system provides an audit trail that attests to our application of these standards. Our work plan was designed to meet the responsibilities for submitting a report that is based on the guidelines set forth in *Section L* of *Appendix D* and *Section M* of *Appendix E* to former Chapter 4901:1-11, O.A.C.

Schumaker & Company performed this review as an independent contractor. Any conclusions, results, or recommendations formulated may be examined by any participant to the proceeding for which this report was generated.

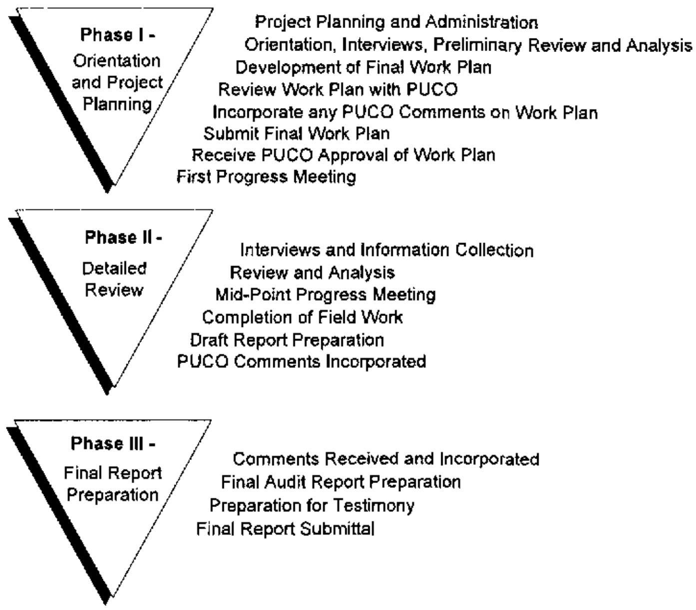
A. Approach and Methodology

Our approach to this review was based on a three-phase review process:

- Phase I – Orientation and Project Planning
- Phase II – Detailed Review
- Phase III – Final Report Preparation

These phases, and the individual sub-steps that were included therein, are shown in *Exhibit I-1*.

Exhibit I-1
Project Phases



B. Work Plan Tasks

This is the third year of our review of fuel and purchased power of Duke Energy Ohio, Inc. Our review included not only the items identified in the RFP, with some items being covered in more depth and some less based upon our preliminary observations within the area but also a follow-up on our findings and recommendations from our previous reviews. In addition, there were several items that cannot be fully addressed until the next audit cycle in that they are currently in process and not yet completed. These items have been identified for review in the next audit.

Although no specific statutory or administrative requirements exist for auditing fuel, purchased power, and related costs for electricity in Ohio, we used the general guidance contained in the previous *Appendix D* and in *Appendix E* to Chapter 4901:1-11, O.A.C., which were attachments to the RFP. In performing the financial review, we selected four random months of FPP and SRT filings in 2011 from which we traced the charges to transactions, MISO invoices, other bilateral transactions, other Duke Energy Ohio documentation, etc. Schumaker & Company analyzed, interpreted, and made specific recommendations with respect to the structure, policies, and procedures of the Duke Energy Ohio's fuel procurement, fuel utilization, power purchases, capacity purchases, and related functions in particular as such items impacted 2011 results.

C. Duke Energy Ohio, Inc.

Electric utilities within the State of Ohio have been deregulated to a certain extent. Power generation facilitates have been placed in separate unregulated affiliates or completely sold to unaffiliated third parties[1]. In the case of Duke Energy Ohio, the responsibility for power generation, fuel and purchased power activities are located in the unregulated affiliate. The Midwest Commercial Generation (MCG) organization of Duke Energy Ohio is responsible for managing the power, fuel, and emission allowance positions for Duke Energy Ohio's operating units, including its Ohio generation portfolio. The MCG organization is responsible for establishing and implementing the multi-commodity risk management strategy for power, fuel, and emission allowances by monitoring and adjusting the contract mix all the way through physical delivery. These adjustments result in the purchases or sales of fuel, emission allowances, and power for the approved term if the forward market allows them to transact.

In October 2011, Duke Energy Ohio reached a settlement agreement with most of the intervening parties involved with its application for an Electric Security Plan (ESP) filed with the Public Utilities Commission of Ohio (PUCO) on June 20, 2011. This ESP covers the company's generation service from January 1, 2012 through May 31, 2015. The key terms of the settlement included:

- *A competitive auction process to determine customer rates – The provision of Standard Service* Offer (SSO) via a descending-clock format competitive bid process similar to some other states and jurisdictions with PUCO oversight of the procurement process.
- A non-bypassable stability charge provided to Duke Energy Ohio from 2012 to 2014 which will be subject to audits by the PUCO at their discretion and several other riders for various items including for alternative energy.
- Duke Energy Ohio must transfer its generating assets to an affiliate by December 31, 2014 to encourage competition
- Duke Energy Ohio will continue supporting economic growth and job creation within its service territory
- Funding of low income families to support weatherization programs and fuel fund assistance

The first auction of held in December 2011. The FPP and several other riders have been terminated with some aspects of previous riders being replaced by different riders.

[1] / Ohio law provided this as an option and it is one in which the PUCO approved for Duke Energy.

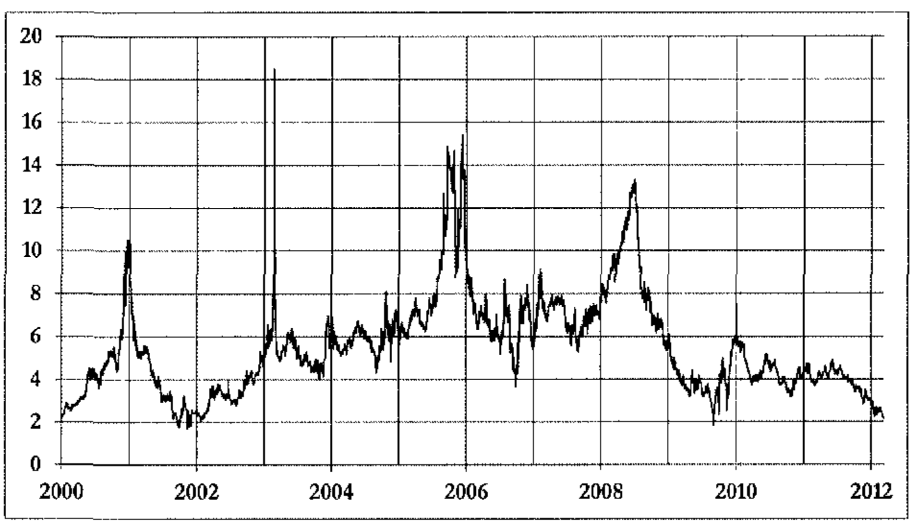
II. Utility Perspective

The energy industry has changed significantly in the last ten years. With the advent of deregulation, energy companies have been forced to rethink and restructure their business models. Previously vertically integrated companies have had to separate their business into individual components with generation assets being put into separate entities or divested altogether, the creation and, in many cases, dissolution of energy trading operations, the control of transmission assets being ceded to some form of independent system operator (ISO), the energy distribution and customer service operations of the utility being restructured, and the unbundling of rates into individual generation (or supply), transmission, distribution, and customer service components.

In states where deregulation has progressed, many of the rate caps are expiring and electrical energy pricing is become more market driven to the individual consumer. In all cases even in states where deregulation either did not occur or got started and reversed, the cost of electrical energy is experiencing upward pressure, primarily due to increasing cost of the source fuel.

One of the most significant developments over the last several years is that natural gas pricing has remained at historically low price level as shown in *Exhibit II-1*. In particular these low prices have made combined cycle combustion turbine (CCCT) plants in many cases competitive, on an incremental basis, with coal fired generation.

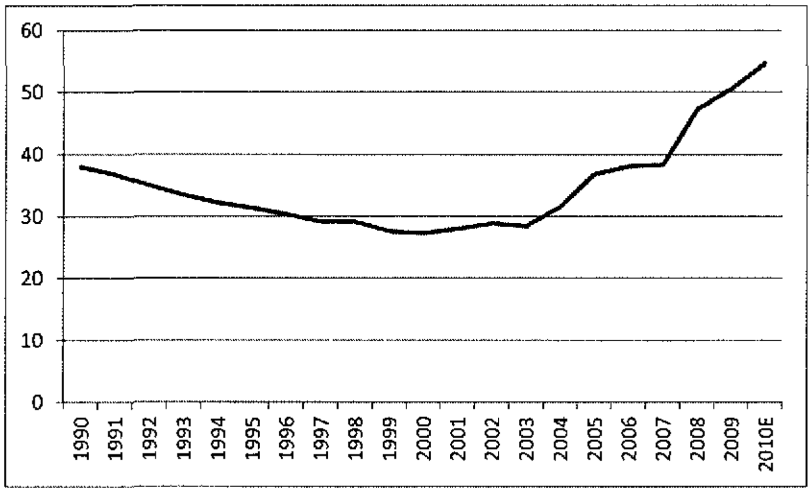
Exhibit II-1
Historical Natural Gas Pricing
Henry Hub



Source: U.S. Energy Information Administration

The slow continual rise in the cost of coal fired generation, as shown in *Exhibit II-1*, combined with the uncertainty regarding environmental regulations has caused a slight movement away from coal fired generation especially with respect to new generation sources.

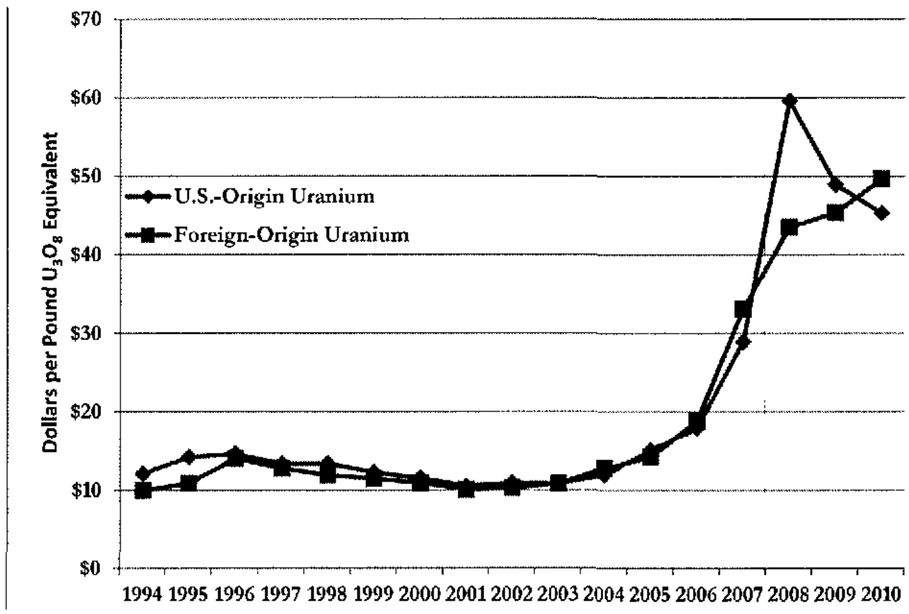
Exhibit II-2
Historical Coal Pricing



Source: U.S. Energy Information Administration http://www.eia.doe.gov/emeu/aer/coal.html

With the exception of natural gas, the cost of all types of energy used in the production of electricity has been increasing are illustrated in *Exhibit II-2* and *Exhibit II-3*. Throughout the 1990's the actually cost of coal was slightly decreasing as shown in *Exhibit II-2*, however beginning in early 2000 the price has slowly continued to increase. Natural gas on the other hand, has fluctuated rather significantly since the year 2000 as shown in *Exhibit II-1* from a high of over $14 to a low of around $2 in the early 2000. It is now backed near the $2 level. Uranium had been relatively flat for many years (since the mid 1990s) but has recently begun to see some significant increases in cost as shown in *Exhibit II-3*.

Exhibit II-3
Historical Uranium Pricing
Weighted-Average Price of Uranium
Purchased by Owners and Operators of
U.S. Civilian Nuclear Power Reactors



Source: U.S. Energy Information Administration; 2010 Uranium Marketing Annual Report, Table S1a; Released May 31, 2011.

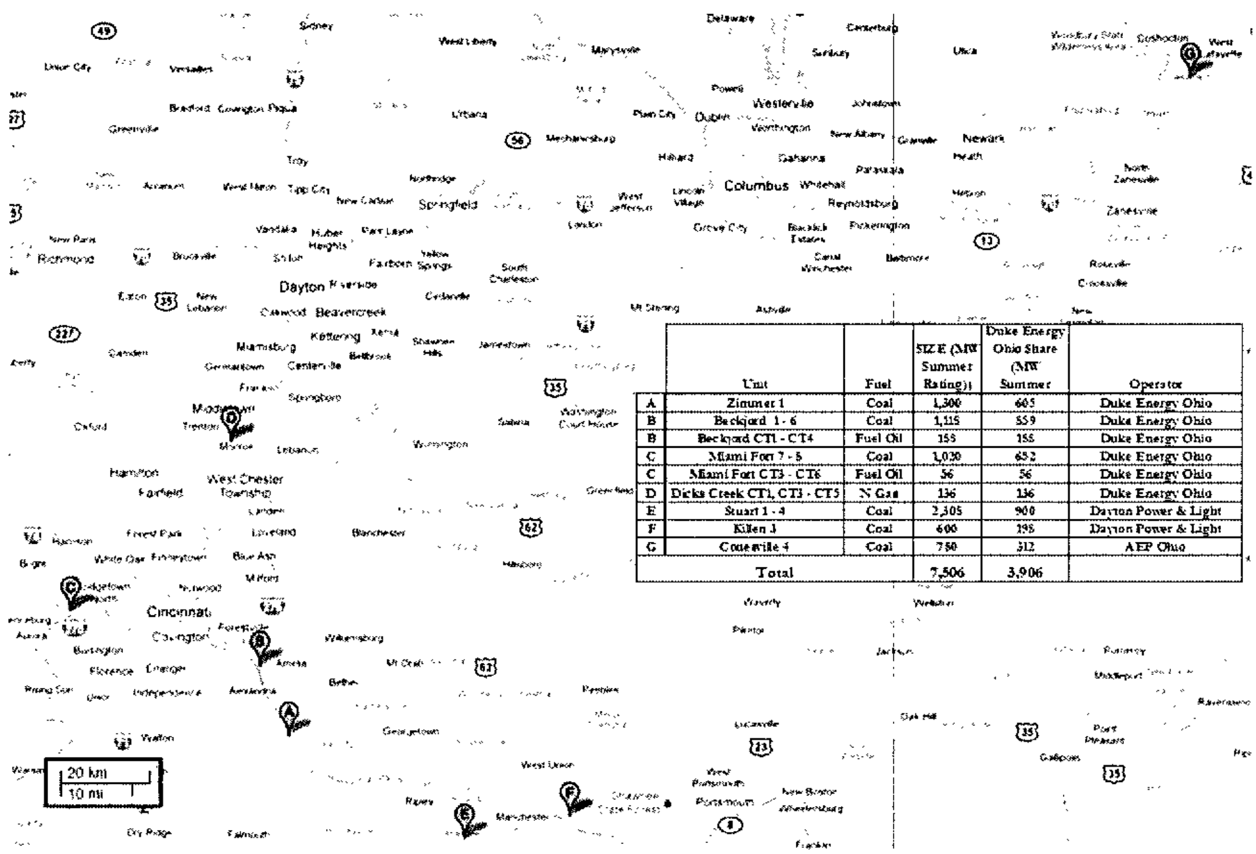
Although much has changed in the electric utility industry, some basics remain – such as electricity must still flow through wires. The actual operations of retail electricity distributors consist of generating or acquiring wholesale power (often under long-term supply contracts), maintaining and extending a line network, and billing and collections. The facilities and equipment needed to provide this energy must be built and maintained, meters must be read and bills generated, and storms must be addressed. New technologies have been developed in the last ten years that have changed the way that a utility can perform some of these functions, but they all still revolve around having an adequate trained workforce to meet the day-to-day needs of the customer. How well the utility is organized and managed to address these basic business requirements, including its interactions with affiliates, is of interest for this audit.

III. Fuel Forecasting & Procurement

A. Background

During 2011, Duke Energy Ohio continued to have 3,906 megawatts (MWs) of generating capacity covered by the Fuel and Purchased Power (FPP) rider. Fifteen (15) units (3,526 MWs) are fueled with coal, four (4) units (136 MWs) are powered by natural gas, and eight (8) units (244 MWs) use fuel oil. Duke Energy Ohio operates nine (9) of the coal units (2,117 MWs) and all twelve (12) of the natural gas and fuel oil units. Dayton Power & Light operates five (5) of the coal units (1,098 MWs) and American Electric Power Co. (AEP) Ohio (Columbus Southern Power) operates one (1) coal unit (312 MWs). *Exhibit III-1* summarizes Duke Energy Ohio's generating assets.

Exhibit III-1
Locations and Capacity of Duke Energy Ohio's Generating Assets
as of December 31, 2011



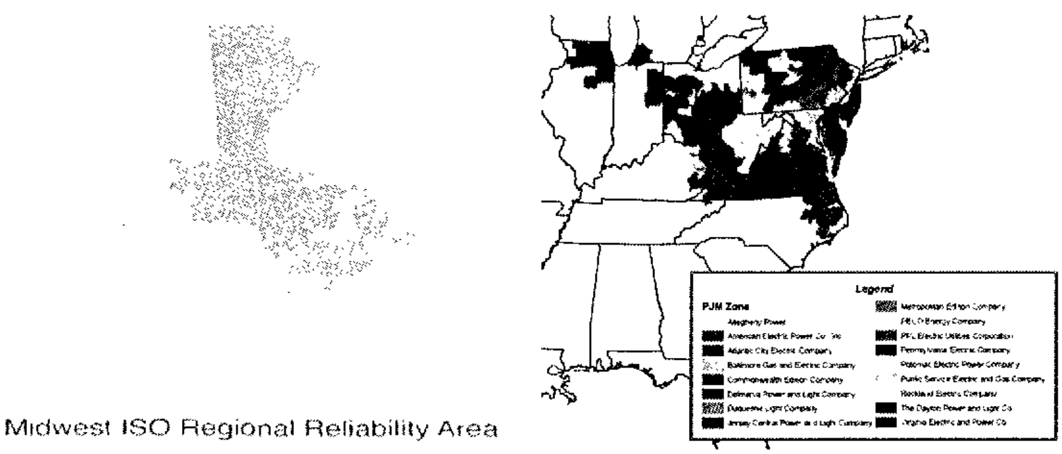
	Unit	Fuel	SIZE (MW Summer Rating))	Duke Energy Ohio Share (MW Summer	Operator
A	Zimmer 1	Coal	1,300	605	Duke Energy Ohio
B	Beckjord 1 - 6	Coal	1,115	559	Duke Energy Ohio
B	Beckjord CT1 - CT4	Fuel Oil	155	155	Duke Energy Ohio
C	Miami Fort 7 - 8	Coal	1,020	652	Duke Energy Ohio
C	Miami Fort CT3 - CT6	Fuel Oil	56	56	Duke Energy Ohio
D	Dicks Creek CT1, CT3 - CT5	N Gas	136	136	Duke Energy Ohio
E	Stuart 1 - 4	Coal	2,305	900	Dayton Power & Light
F	Killen 2	Coal	600	198	Dayton Power & Light
G	Conesville 4	Coal	780	312	AEP Ohio
Total			7,506	3,906	

Source: Information Response 40, Interview 70, Schumaker & Company Analysis, and Google Maps

During 2010, Duke Energy Ohio announced its intention to move from MISO to the PJM Interconnection, LLC (PJM) regional transmission organization and applied for membership in PJM. Duke Energy Ohio's decision to switch regional transmission organizations was based, in part, on FirstEnergy's (serving northern Ohio) change from MISO to PJM in addition to other strategic reasons. This switchover left Duke Energy Ohio as the only remaining investor-owned utility in the State of Ohio that was a member of MISO. Co-owners (Dayton Power and Light and American Electric Power) of Duke Energy Ohio's portion of Stuart, Killen, and Conesville-generating assets were already members of PJM. Duke Energy Ohio sold its portion of Killen and Conesville generation into PJM starting on September 1, 2010. Duke Energy Ohio continued as a member of the Midwest Independent System Operator (MISO) organization during 2011 but completed the move to PJM on January 1, 2012. *Exhibit III-2* shows the territories served by both MISO and PJM.

As a member of MISO or PJM during 2011, Duke Energy Ohio sold its generating output into the organization's wholesale market and obtained its electricity to serve its load from the same organization's market rates. Effective January 1, 2012, Duke Energy Ohio began to be supplied with electricity secured through an annual open bidding process approved by the Public Utilities Commission of Ohio (PUCO).

Exhibit III-2
MISO and PJM Territory
as of December 31, 2011



Source: http://www.midwestmarket.org/page/About%20Us and http://www.pjm.com/about-pjm/how-we-operate/territory-served.aspx

Exhibit III-3 shows the organizations responsible in 2011 for Duke Energy Ohio's fuel management processes which realigned during 2010. For analysis, the responsibilities can be grouped into three categories:

- Fuel Forecasting & Procurement
- Fuel Handling & Inventory
- Plant Operation & Maintenance

The Fuel Forecasting & Procurement processes are analyzed in this chapter.

Exhibit III-3
Duke Energy Ohio Responsibilities for Fuel Management Processes
2011

		Duke Energy Ohio Organization					
		Commercial Analytics	**Portfolio Risk Management**	**Commodity Logistics**	**Generation Dispatching**	**Plant Operations**	**Plant Maintenance**
FUEL	**Forecasting**						
	Procurement						
	Logistics			■			
	Utilization				■	■	
	Maintenance			■			■

Fuel Forecasting & Procurement Chapter Fuel Logistics & Inventory Chapter [illegible]

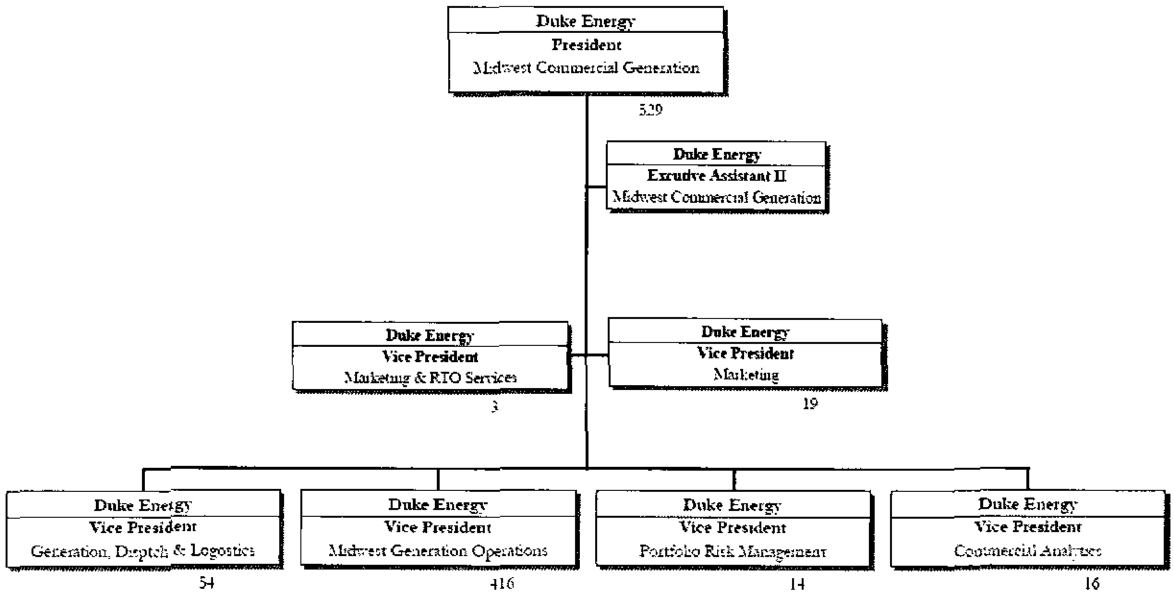
Source: Information Response 127, Interviews 37, 39, and 41, and Schumaker & Company analysis

B. Findings and Conclusions

Finding III-1 **There were two (2) organizations with thirty-two (32) employees responsible for forecasting and procuring Duke Energy Ohio's fuel during 2011.**

Schumaker & Company consultants requested organizational charts and interviewed applicable managers to verify fuel management process responsibilities. *Exhibit III-4* shows the two organizations that are accountable for forecasting and procuring fuels for the generating assets operated by Duke Energy Ohio. The Commercial Analytics organization forecasts fuel requirements and the Portfolio Risk Management organization acquires the fuel from suppliers.

Exhibit III-4
Duke Energy Ohio's Fuel Forecasting & Procurement Organizations
2011

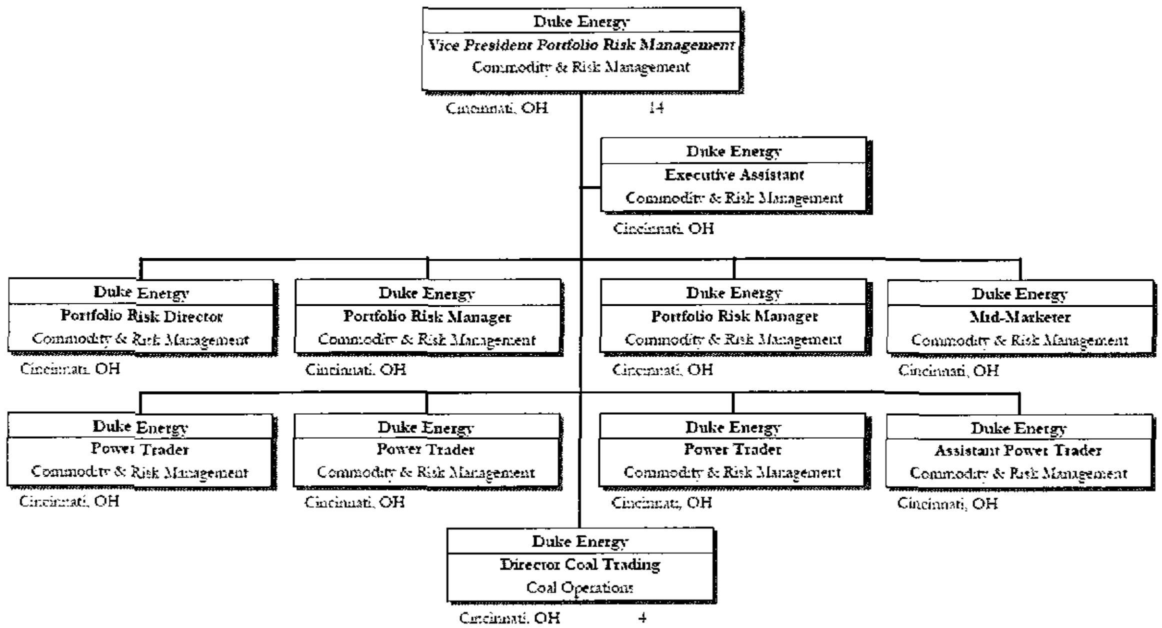


Source: Information Response 272 and Interviews 37, 40, 64, and 74

The Portfolio Risk Management organization, *Exhibit III-5*, has fourteen (14) FTEs, excluding the Vice President. The Commodity Risk Management organization's responsibilities include but are not limited to:

- Managing the real-time, day ahead (DA) through three (3) months out and three (3)+ months out through December 2011 power positions
- Managing the coal positions for each coal unit and plant using long-term (one to three years) and "spot purchase/sale" contracts
- Managing the daily and annual emission allowance positions for sulfur dioxide (SO_2), and nitrogen oxide (NO_x)
- Managing the capacity position to maintain a reliability reserve margin
- Managing the natural gas and fuel oil positions for the gas-fired combined cycle and peaking units
- Managing the Annual Revenue Rights (ARR) and Financial Transmission Rights (FTRs)
- Managing the Renewable Energy Credits (REC) position for Duke Energy Ohio's load obligation

Exhibit III-5
Portfolio Risk Management Organization
as of December 31, 2011



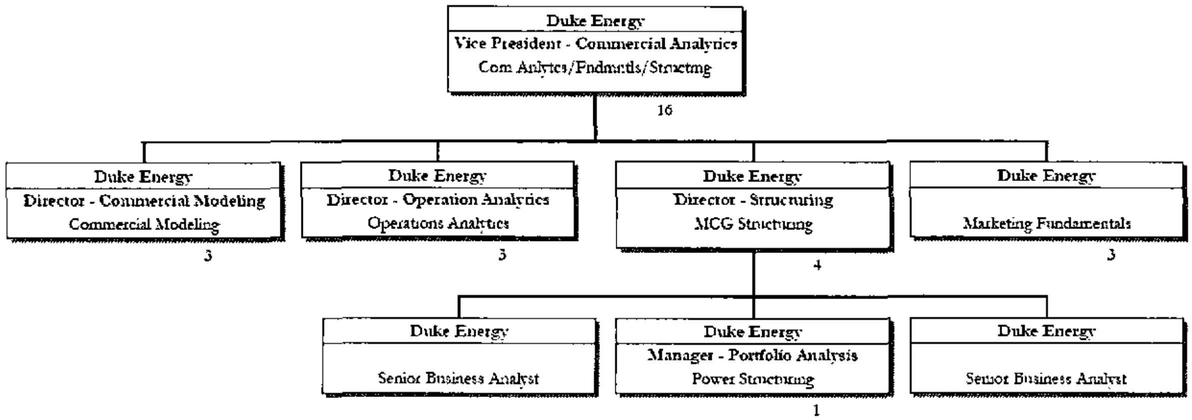
Source: Information Response 272 and Interviews 52 and 74

The Vice President, Commercial Analytics, *Exhibit III-6*, has sixteen (16) full-time equivalent (FTE) employees, excluding himself, within his organization. Organizational responsibilities include but are not limited to:

- Providing Duke Energy Ohio with a daily forecast, based on input assumptions that are updated daily, of positions[2] for power, coal, and emission allowances using a computer model (Commercial Business Model)
- Operating, maintaining, testing, and improving the Commercial Business Model (CBM)
- Presenting fundamental information/analysis/views on power, gas, coal, oil, and emission allowances markets
- Coordinating, managing, and supporting model development projects in support of Duke Energy Ohio strategies
- Designing database structures supporting model development.

[2] / Position means "short" or "long" in the context of serving the retail load. e.g. When the forecast indicates that the retail load will be 1000 MW but the utility only has 900 MW generating capacity, the utility is said to be "short" in power and must buy 100 MW from the market. When the utility has purchased 15,000 tons of coal for a generating unit for a month but only needs 7,500 tons because the unit experienced an unscheduled outage and will be unavailable for 2 weeks, it is said to be "long" in coal and can sell 7,500 tons in the market if conditions are favorable..

Exhibit III-6
Commercial Analytics Organization
as of December 31, 2011



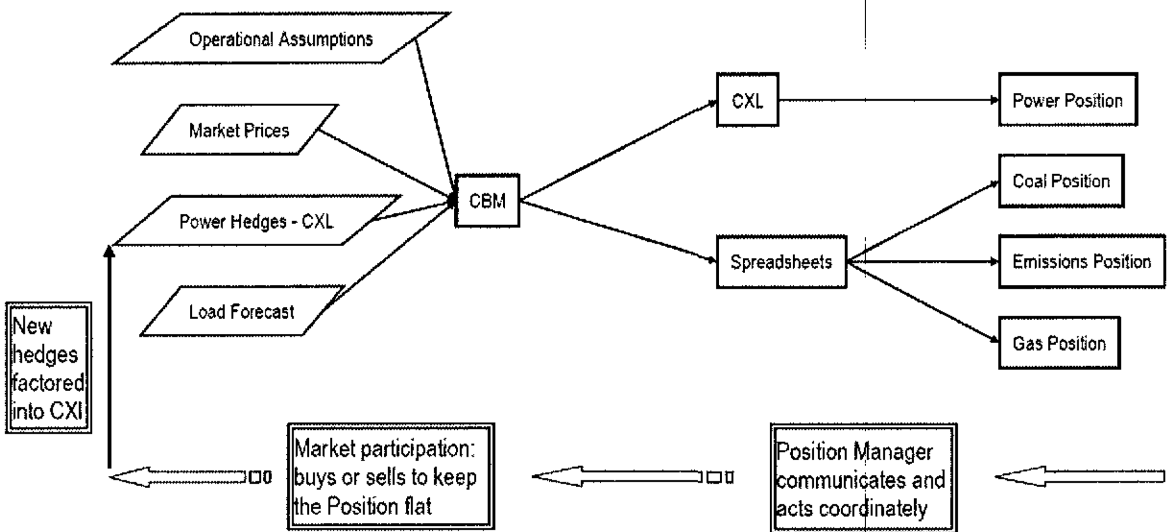
Source: Information Response 272 and Interviews 40 and 64

Finding III-2 Duke Energy Ohio continues to use a "Monte Carlo Simulation Based" computer model to forecast future fuel, power, emission allowance, capacity, and FTR positions.

Schumaker & Company requested and reviewed documentation, which was confirmed with interviews and demonstrations, of the computer model referred to as the Commercial Business Model (CBM). *Exhibit III-7* provides a flow diagram of the inputs and outputs of the forecasting model. Commodity XL (CXL), shown on the diagram, is a multi-commodity platform (including Power XL and Coal XL) that integrates all front-to-back office procedures (i.e., trade capture, confirmation, scheduling, settlement, and accounting) into a single next-generation, highly scalable, and customizable platform.

CBM became the official model for all of Duke Energy on October 1, 2011. Duke Energy is currently evaluating the use of the model for its recent Florida acquisition.

Exhibit III-7
CBM Data Flow Diagram
as of December 31, 2010



Source: Information Response 2

In addition to position forecasting, the model is used to value and quantify risks for:

- Structured contracts
- Load-following deals
- Generation dispatch

CBM changes must have approval from:

- Vice President – Portfolio Risk Management
- Vice President – Commercial Analytics
- Vice President – Midwest Generation Operations

Finding III-3 **Duke Energy Ohio continued quarterly testing during 2011 to ensure that the forecasts from its Commercial Business Model (CBM) produce results, within acceptable limits, that match actual occurrences.**

Schumaker & Company requested and evaluated data demonstrating the accuracy of comparing the CBM forecast with actual occurrences. *Exhibit III-8* provides the Executive Summary for the test conducted for Quarter 4, 2011. Duke Energy's Global Risk Management Department continues to coordinate the back testing of CBM.

Exhibit III-8
Executive Summary of CBM Back Tests
Quarter 4, 2011

Executive Summary of CBM <u>Replication Tests</u>

We just completed a CBM back test for Q4 of 2011 (Oct 1st, 2011 through Dec 31st, 2011). These are tests performed to demonstrate CBM's ability to replicate a specific historical output pattern based on corresponding historical inputs. For example, for a given historical weather scenario how well can CBM replicate the historical load? Or for a given historical scenario of commodity prices and outage occurrences, how well can CBM replicate the generation output (MWHrs, margins, emissions, etc). This type of testing is also known as "back-testing", which will compare actual results with model-generated results. The quarterly testing will be reviewed by a member of GRM to ensure the accuracy of the historical inputs utilized for the test date, as well as, to verify the modeled outputs are within defined tolerance bands for variances. Furthermore, if the modeled outputs are outside the defined tolerance bands, GRM will confirm and document conclusions made regarding noted exceptions, and if necessary, assure that the necessary steps will be been taken to rectify any potential problems.

Source: Extract from Information Response 313 (b)

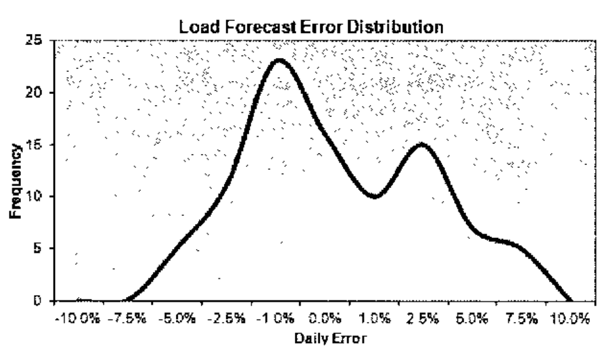
Exhibit III-9 provides the result of the Load Simulation back testing for Quarter 4 of 2011. All results were within Duke Energy's error tolerance range specified in the "CBM Testing Strategy" document.

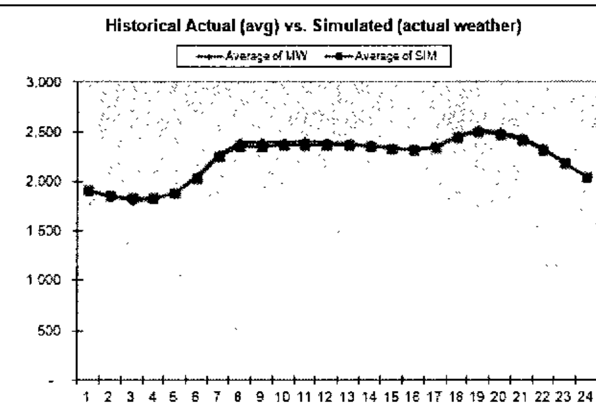
Exhibit III-9
Results of CBM Load Simulation Model Back Test
Quarter 4, 2011

I- CBM Load Simulation Model Back Test

This test is designed to demonstrate how well CBM load simulation function performs against realized load based on actual weather data. The inputs are historical weather, regression coefficients and historical CG&E load the output are simulated CG&E load and CBM load simulation errors when compared with realized load data

The summary of the test results: the arithmetic average simulation error for the test period is -.38%, but the errors are -.50%, -.43%, and -.21% for months Oct, Nov and Dec respectively. The average of error magnitude (removing signs) is 2.15% and the errors are 1.59%, 2.18% and 2.67% for Apr, May and Jun respectively. They are all within the error tolerance range specified in the CBM Testing Strategy Document. The simulated load shapes also match the historical load shapes very well



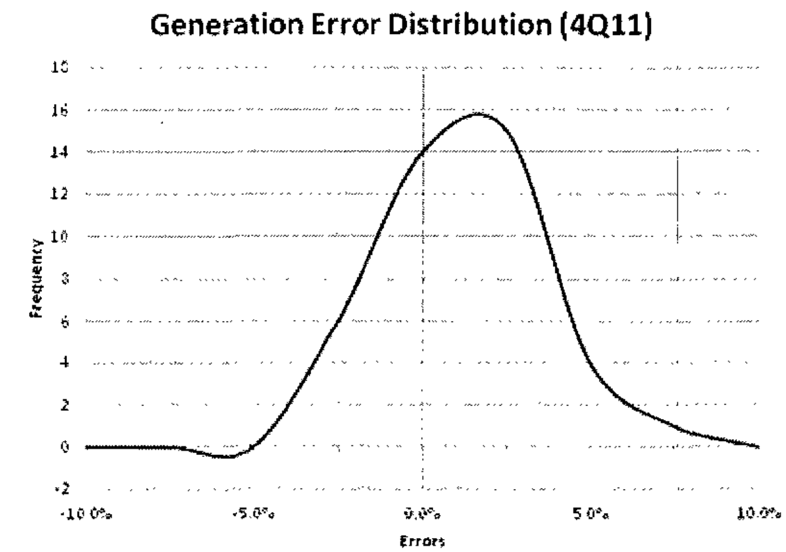


Source: Extracts from Information Response 313 (b)

Exhibit III-10 shows the Quarter 4, 2011 results of the Generation Dispatching Model back test again within testing strategy error range limits.

Exhibit III-10
Results of CBM Generation Dispatching Model Back Test
Quarter 4, 2011

II- CBM Generation Dispatching Model Back Test	Result Summary
This test covers the time period between Oct 1, 2011 and Dec 31, 2011. The test is designed to demonstrate how well CBM generation dispatching function performs against the actual generation of Duke-Ohio units based on historical inputs (energy prices, dispatching cost, planned outages, forced outages, etc) The outputs are by unit generation level and relative errors when comparing model generation level with realized DA awards.	The arithmetic average error across all the units for the entire tested time period 4Q11 is 1.76%, but the errors are -0.39%, 2.11% and 3.89% respectively for Oct, Nov and Dec, the average of error magnitude (removing signs) is 3.23% for the testing period and the errors are 2.14%, 3.08% and 4.47% for Oct, Nov and Dec respectively. They are within the error tolerance range specified in the CBM Testing Strategy Document In addition, **if the model uses actual hour by hour derate data implied by the full load offer MW and full load model MW differentials, then the errors will be significantly smaller.**



Source: Extracts from Information Response 313 (b)

Finding III-4 Duke Energy Ohio uses well-documented processes for procuring fuel for the generating units it operates.

Schumaker & Company consultants requested documentation of the fuel procurement processes and verified them with interviews. The draft procedures shown in *Exhibit III-11* were fully implemented by Duke Energy Ohio during 2011. Processes used during 2010 for the procurement of coal, natural gas, and fuel oil as given in *Exhibit III-12*, *Exhibit III-13*, and *Exhibit III-14* did not change for 2011.

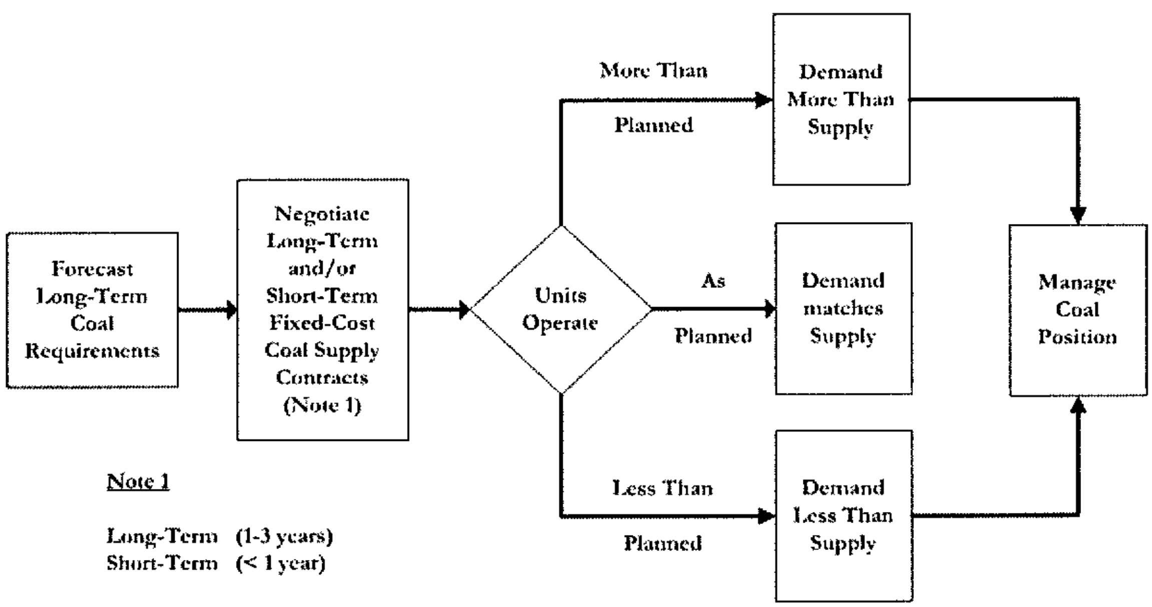
Exhibit III-11
Extract from Title Page of Fuel Procurement Procedures
as of February, 2011

Midwest Commercial Generation (MCG)
Commodity Risk Management
Policy and Procedures

February 2011 Draft

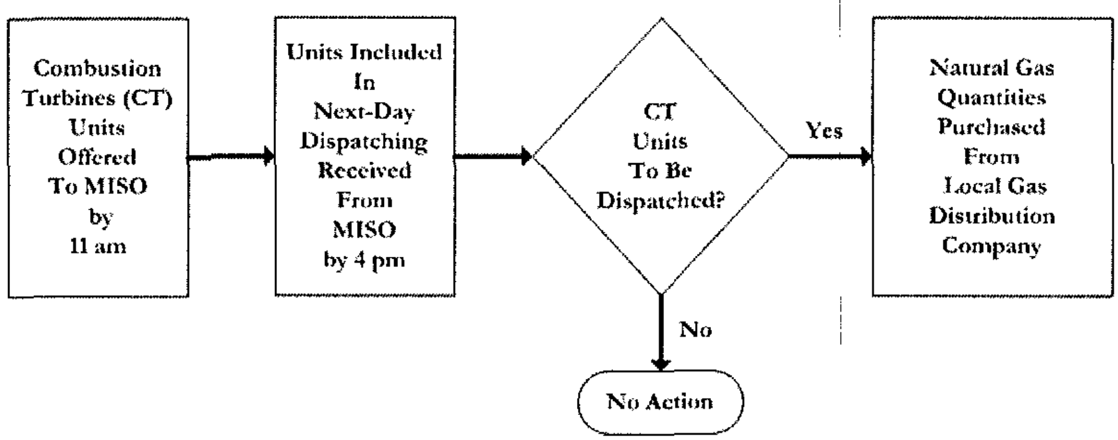
Source: Information Responses 128 and 273

Exhibit III-12
Coal Procurement Process
2011



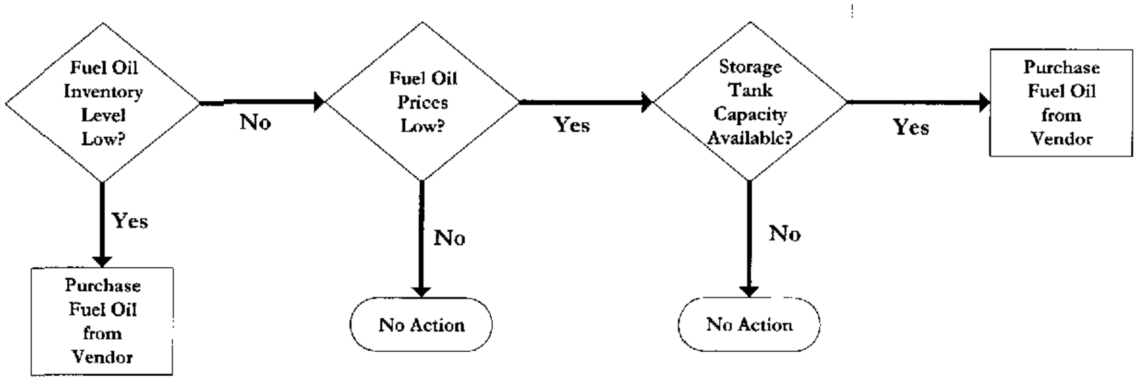
Source: Information Responses 218 and 273, Interview 74, and Schumaker & Company analysis

Exhibit III-13
Natural Gas Fuel Procurement Process
2011



Source: Information Responses 218 and 273, Interview 74, and Schumaker & Company analysis

Exhibit III-14
Fuel Oil Procurement Process
2011

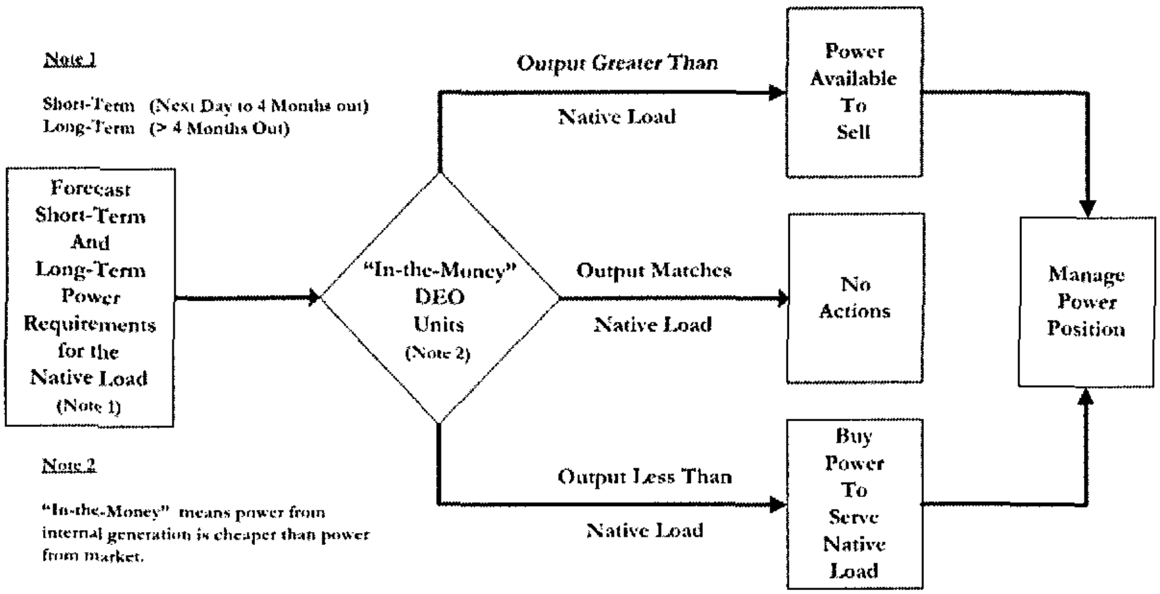


Source: Information Responses 218 and 273, Interview 74, and Schumaker & Company analysis

Finding III-5 **Duke Energy Ohio continues to follow written procedures to buy/sell fuel, power, emission allowances, capacity, and FTRs.**

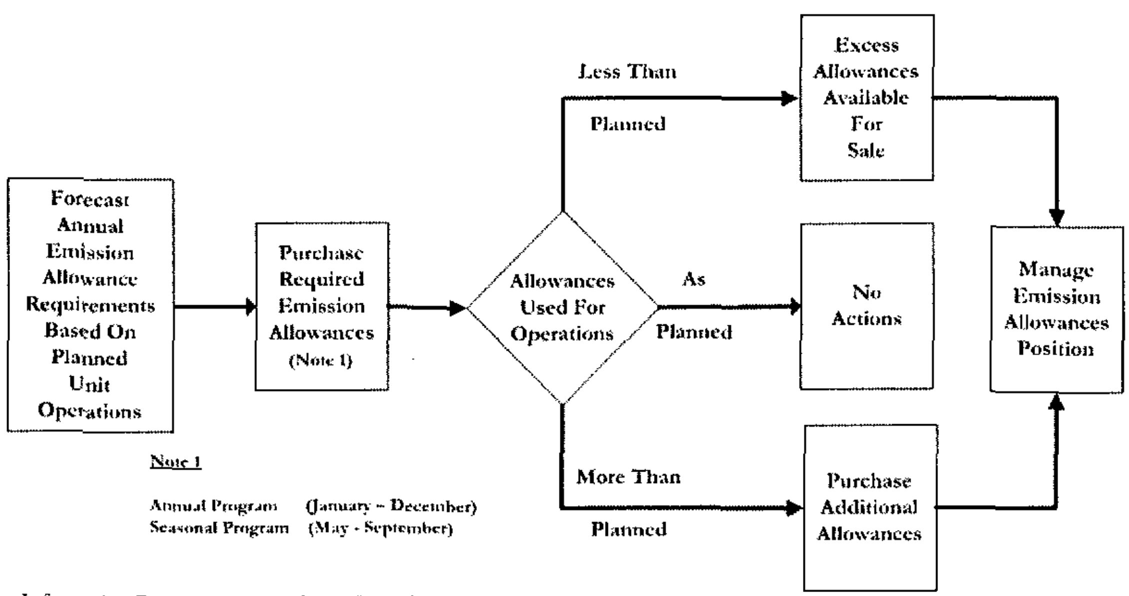
Schumaker & Company consultants verified that Duke Energy Ohio follows procedures to buy and/or sell power, emission allowance, capacity, and Financial Transmission Rights. Procedures are documented in the Commodity Risk Management Policy and Procedure manual, *Exhibit III-11*. The power, emission allowances, capacity, and financial transmission processes, used in 2009, 2010, and 2011, are shown in *Exhibit III-15*, *Exhibit III-16*, *Exhibit III-17*, and *Exhibit III-18*.

Exhibit III-15
Power Procurement Process
2011



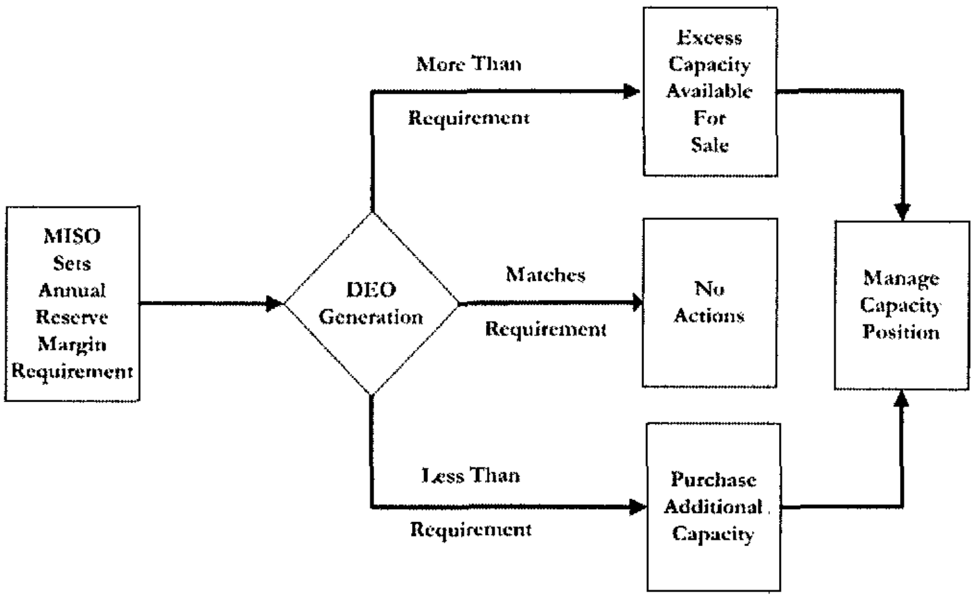
Source: Information Responses 218 and 273, Interview 74, and Schumaker & Company analysis

Exhibit III-16
Emission Allowance Procurement Process
2011



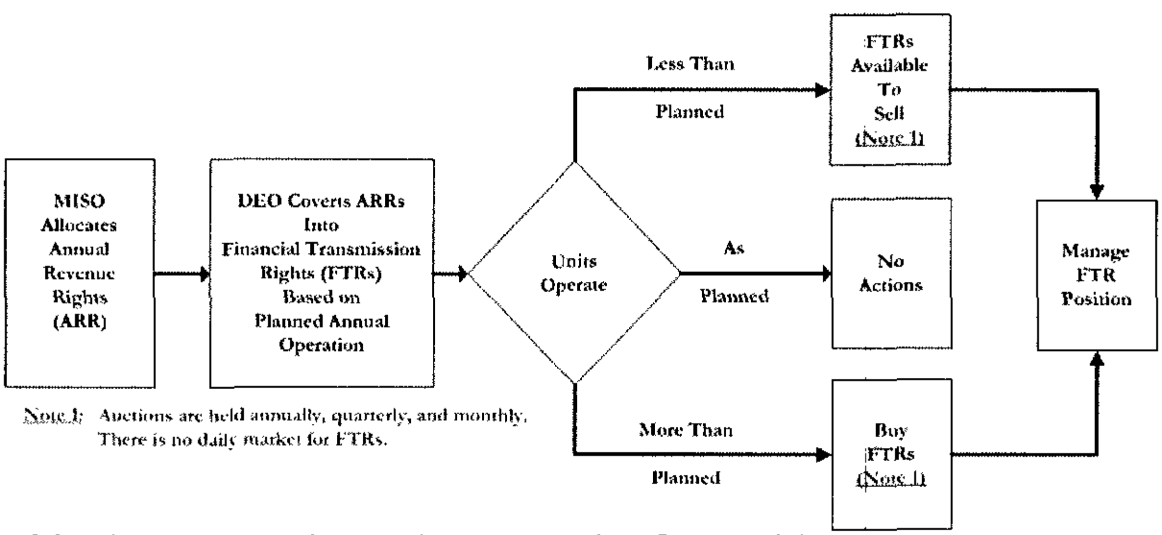
Source: Information Responses 218 and 273, Interview 74, and Schumaker & Company analysis

Exhibit III-17
Capacity Procurement Process
2011



Source: Information Responses 218 and 273, Interview 74, and Schumaker & Company analysis

Exhibit III-18
Financial Transmission Right (FTR) Procurement Process
2011



Source: Information Responses 218 and 273, Interview 74, and Schumaker & Company analysis

Finding III-6 **Duke Energy Ohio continued to use a typical process to manage its commodity (coal, power, emission allowances, capacity, and FTR) positions during 2011.**

Schumaker & Company investigated the commodity position management process used by Duke Energy Ohio by studying documentation and interviewing a number of process participants. Duke Energy Ohio uses the term "Active Management," which is very similar to position management processes used by other utilities with which Schumaker & Company is familiar. A diagram of the commodity position management process used by Duke Energy Ohio is given in *Exhibit III-19*. The Monte Carlo based simulation model used by Duke Energy Ohio introduces higher levels of sophistication to forecasting than typically found in other utility organizations.

Exhibit III-19
Commodity Position Management Process

[redacted]

Source: Information Response 128 and 272, Interview 74, and Schumaker & Company analysis

Finding III-7 **Duke Energy Ohio had eleven (11) long-term fixed-price contracts for the delivery of 6,196,415 tons of coal during 2011.**

Schumaker & Company requested data for all long-term (12+ months) coal contracts that were in effect during 2011. *Exhibit III-20* provides those contracts along with adjustments and delivery status at the end of November 2011. Duke Energy Ohio purchased 19.6% less coal in 2011 (6,196,415 tons) when compared to 2010 (7,708,853 tons). Duke Energy Ohio used 11 long-term contract for 2011 purchases compared to 14 contracts for 2010.

Exhibit III-20
Status of 2011 Coal Contracts
as of November 30, 2011

[redacted]

Source: Information Response 295

Exhibit III-21 provides the specifications of the coal that was delivered to Duke Energy Ohio in accordance with the 11 long-term contracts in effect for 2011.

Exhibit III-21
Specifications of Coal Delivered Per Contract
as of December 31, 2011

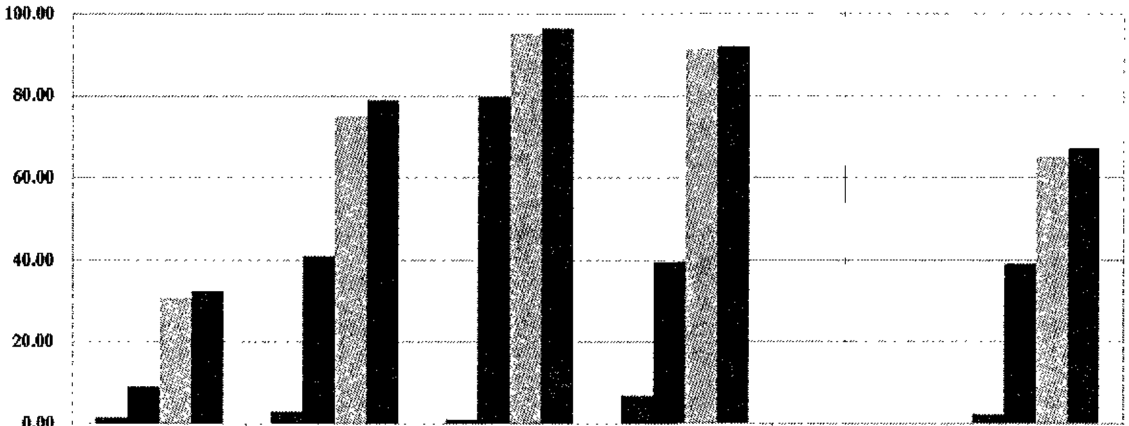
[redacted]

Source: Information Response 295

Finding III-8 **Duke Energy Ohio FPP customers received a $4,438,134 benefit in 2011 from Duke Energy Global Risk Management's approval to swap 226,775 tons of coal to non-native load that was originally purchased on long-term contracts to serve native load.**

Duke Energy Ohio continued to experience customer switching during 2011 as shown in *Exhibit III-22*. This switching resulted in the native customer coal positions having accumulated more coal than required for the lower level of customer demand. Duke Energy Ohio executed two (2) transactions approved by Duke Energy Global Risk Management to swap coal purchased for native customers to non-native load.

Exhibit III-22
Percent of Load Switched by Customer Class
Year End
2008 - 2011



	Residential	Commercial	Industrial	Other		Total
2008	1.62	2.93	1.03	7.05		2.31
2009	9.29	41.17	79.86	39.55		39.21
2010	30.75	75.10	95.36	91.30		65.08
2011	32.46	79.10	96.53	92.14		67.25

Source: Information Responses 230 and 307

Exhibit III-23 shows the analysis, reviewed and approved by Duke Energy Global Risk Management, which documents the value of the swap benefits to native load customers.

Exhibit III-23
Reasons for and Principals of the Coal Swap

[redacted]

Source: Information Response 302 and Interviews 66 and 74

Finding III-9 **Total coal delivered to Duke Energy Ohio plants decreased 15.4% in 2011 from 2010 levels.**

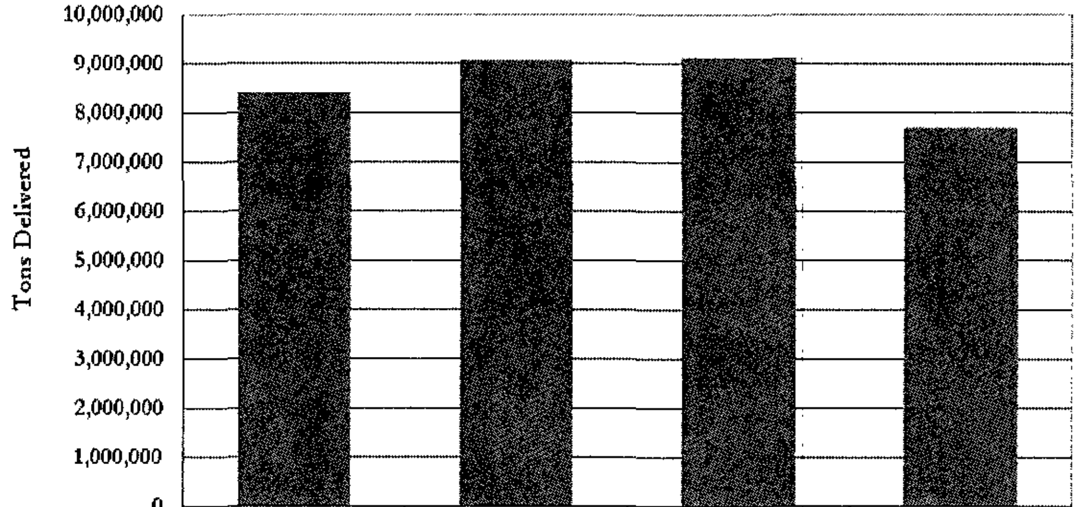
Exhibit III-24 provides the Schumaker and Company analysis of coal deliveries to Duke Energy Ohio plants in total and by plant for 2008-2011. Total tons delivered to the three individual plants were down 1,404,288 tons (15.4%) from the 2010 level. Deliveries to Beckjord, Miami Fort and Zimmer were down 10.5% (177,734 tons), 10.5% (373,541 tons), and 22.0% (853,013 tons) respectively.

Contributions to the decreased need for coal during 2011 included:

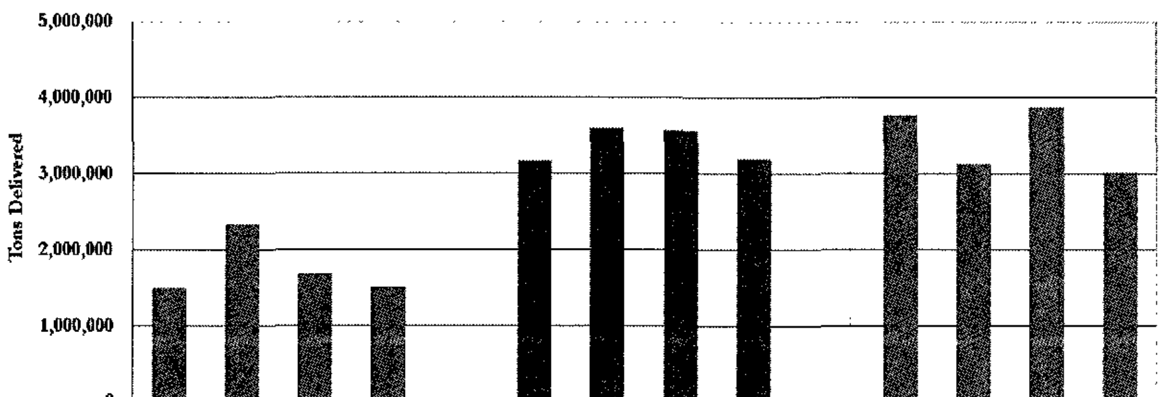
- Customer switching
- An unplanned outage at Zimmer in the fall
- An unplanned outage at Miami Fort

The charts for the three individual plants also indicate that coal deliveries for the Beckjord Plant increased in 2009, while deliveries to the Zimmer Plant decreased in 2009. The change at the two plants resulted from a unit outage at Zimmer in the spring of 2009.

Exhibit III-24
Total Annual Coal Delivered
2008 to 2011



	2008	2009	2010	2011
Total Tons Delivered	8,439,016	9,079,871	9,129,085	7,724,797



	Beckjord					Miami Fort					Zimmer			
	2008	2009	2010	2011		2008	2009	2010	2011		2008	2009	2010	2011
Total Tons Delivered	1,503,277	2,342,636	1,690,077	1,512,343		3,166,203	3,603,723	3,564,608	3,191,067		3,769,536	3,133,512	3,874,400	3,021,387

Source: Information Responses 15, 140, and 282

Finding III-10 **Duke Energy Ohio had a 14.1% increase based on dollars per ton and 14.9% based on cents per million BTU (MMBtu)[1] in the delivered price of coal in 2011 from the 2010 level.**

Schumaker & Company consultants analyzed the cost of coal delivered to the plant for 2008 through 2011. The cost comparisons from 2008 through 2011 are given in *Exhibit III-25*. The commodity cost between 2010 and 2011 (dollar per ton) increased by 13.5% [redacted] while the transportation cost increased 21.3% [redacted] during the same period. [redacted]

Exhibit III-25
Coal Costs
2008 to 2011

[redacted]

Source: Information Responses 15, 140, and 282

[1]/ MMBtu is one (1) million BTU. A British Thermal Unit (BTU) is the amount of heat energy needed to raise the temperature of one pound of water by one degree F. This is the standard measurement used to state the amount of energy that a fuel has as well as the amount of output of any heat-generating device.

The costs increases resulted from new coal supply contracts that were negotiated with [redacted] and [redacted] coal companies as explained in *Exhibit III-26.* [redacted]

Exhibit III-26
Duke Energy Ohio Explanation for Coal Cost [redacted] in 2011 from 2010
April 12, 2012

"In 2008-2010 the contract that Duke Energy Ohio had with Peabody and Alliance the pricing was [redacted] In 2011 the new contracts The Company had with both [redacted] were significantly [redacted] The difference can be attributed to timing when the contracts were negotiated."

Source: Information Response SCHU-INF-02-001 (e-mil dated April 12, 2012)

Finding III-11 "Spot" purchases [redacted] during 2011 from 2010 for Duke Energy Ohio.

The results of the analysis by Schumaker & Company consultants of the quantity of coal that Duke Energy Ohio purchased from both the "spot"[4] and "contract"[5] markets between 2008 and 2011 is presented in *Exhibit III-27*.

Exhibit III-27
Percent of Delivered Coal Cost from Spot vs. Contract Purchases
2008 to 2011

[redacted]

Source: Information Responses 15, 140, and 282

[4] / "Spot" purchases are defined by the U.S. Energy Information Agency as purchases made under a <=12-month contract term.
[5] / "Contract" purchases are defined by the U.S. Energy Information Agency as purchases made under a 12+-month contract term.

During 2011 10.9%, 18.8%, and 14.7% decreases in "spot" purchases occurred for Beckjord, Miami Fort, and Zimmer stations respectively. The decreased energy requirements from customer switching and decreased availability of Zimmer and Miami Fort because of frozen coal and unplanned outages decreased Duke Energy Ohio's flexibility in purchasing coal from the "spot" market because of its contractual requirement to take coal from its long-term contracts.

Finding III-12 Duke Energy Ohio's total "spot" coal costs (cents per MMBtu) increased 1.7% and total "contract" coal costs increased 23.0% in 2011 compared to 2010.

Schumaker & Company requested and analyzed the prices Duke Energy Ohio paid for coal purchased from the "spot" and "contract" market for 2008–2011. The variability of the heat content of the coals delivered from the different mines is included when "cents per MMBtu" is used as the cost basis. *Exhibit III-28* and *Exhibit III-29* show the results of the analysis, including:

- "Spot" coal costs for Beckjord, Miami Fort, and Zimmer stations in 2011 were 16.9% less than 2008, 10.9% less than 2009, and 1.7% higher than 2010. "Contract" coal costs in 2011 were 30.7% higher than 2008, 21.8% higher than 2009, and 23.0% higher than 2010. "Total" costs in 2011 were 18.8% higher than 2008, 9.8% higher than 2009, and 14.9% higher than 2010.
- Beckjord "spot" coal costs in 2011 were 28.4% lower than 2008, 4.5% lower than 2009, and 3.6% higher than 2010. Beckjord "contract" coal costs in 2011 were 11.0% higher than 2008, 3.2% lower than 2009, and 11.5% higher than 2011. Beckjord "total" costs in 2011 were 7.8% less than 2008, 3.1% less than 2009, and 8.8% higher than 2010.
- Miami Fort "spot" coal costs were 14.1% lower, 21.4% lower, and 4.6% lower than 2008, 2009, and 2010 respectively. 2011 "Contract" costs for Miami Fort were 34.6% higher than 2008, 25.9% higher than 2009, and 20.5% higher than 2010. "Total" Miami Fort coal costs in 2011 were 24.1% higher than 2008, 7.7% higher than 2009, and 11.0% higher than 2010.
- Zimmer "total" coal costs in 2011 were 27.5% higher than 2008, 26.2% higher than 2009, and 22.3% higher than 2010. 2011 "spot" costs for Zimmer were 9.3% lower than 2008, 5.6% higher than 2009, and 7.1% higher than 2010. Zimmer 2011 "contract" costs were 35.8% more than 2008, 29.9% more than 2009, and 22.3% higher than 2010.

Exhibit III-28
Spot and Contract Delivered Coal Cost
2008 to 2011

[redacted]

Source: Information Responses 15, 140, and 282

Exhibit III-29
Spot and Contract Delivered Coal Cost
2008 to 2011

[redacted]

Source: Information Responses 15, 140, and 282

Finding III-13 Duke Energy Ohio's 2011 power trading activities made a positive contribution to controlling FPP costs for its customers.

Schumaker & Company believes that comparing the weighted average purchase/selling price accepted for their transactions with the weighted average market price provides an indication of the effectiveness of Duke Energy Ohio's power trading activities. Generally, a buy transaction with a price less than market would indicate a positive contribution while a higher price than market would contribute negatively. The reverse would apply for sell transactions, i.e. selling price greater than market would provide a positive contribution.

During 2011, Duke Energy Ohio traded power in both the MISO and PJM Markets (Hubs). The PJM trades were conducted through the AD Hub (previously Aep/Dayton). The MISO trades were processed through the IND Hub (CIN Hub until December, 2011). Trades are designated as "peak" (16 hours by 5 days excluding holidays) and "non-peak" (8 hours by 5 days plus weekend plus holidays).

Duke Energy Ohio had 29 "buy" transactions at the MISO IND Hub (14 off-peak and 15 peak) during 2011. There were 23 "buy" transactions (11 off-peak and 12 peak) at the PJM AD hub during the same period. During 2011, Duke Energy Ohio had 4 "sell" trades (3 non-peak and 1 peak) at the IND hub and 49 trades (24 non-peak and 25 peak) "sell" trades at the AD Hub.

Historical peak and non-peak market pricing data by trading hub is available from the IntercontinentalExchange (www.theice.com). Historical peak pricing data for 2011 for the IND and AD Hubs was extracted and loaded into excel spreadsheets. Historical non-peak pricing for the IND Hub was also extracted and loaded. There was no 2011 non-peak data for the AD Hub. Comparison of pricing data for 2010 between the IND and AD hubs indicated that pricing for the two hubs was similar but not identical. Because of the 2010 similarity of non-peak pricing between the two hubs, 2011 historical pricing for the IND Hub was used as 2011 non-peak pricing for the AD Hub for analytical purposes. Monthly weighted average market pricing per megawatt hour (MWH) data for peak and non-peak power was calculated from the downloaded data.

Exhibit III-30 and *Exhibit III-31* present the results of the "Buy" and "Sell" transaction analysis for the MISO IND Hub. *Exhibit III-32* and *Exhibit III-33* give the results of the market trades conducted at the PJM AD Hub. Adding the "Net 2011 Benefit to Customers" from *Exhibit III-30* through *Exhibit III-33* indicates there was a benefit to Duke Energy Ohio customers of $2,135,000.

Exhibit III-30
Net 2011 Customer Benefits of MISO IND Hub "Buy" Power Transactions as of December 31, 2011

2011 BUY TRANSACTIONS AT MISO IND HUB													
	Off-Peak Power					Peak Power					Monthly Hours		
	Number of Trades	Allocated MWs Purchased	Weighted Avg Price Paid	Weighted IND Hub Avg Market Price	Benefit to Customers	Number of Trades	Allocated MWs Purchased	Weighted Avg Price Paid	Weighted IND Hub Avg Market Price	Benefit to Customers	Off-Peak	Peak	Dollar Benefit to Customer
Calculations >>		(1)	(2)	(3)	(4) = (3-2)		(5)	(6)	(7)	(8) = (7-6)	(9)	(10)	(1*4*9) + (5*8*10)
Jan	0	0		$31.86	$31.86	0	0		$45.39	$45.39	424	320	0
Feb	2	22	$30.25	$26.78	-$3.47	0	0		$37.54	$37.54	368	304	-28,061
Mar	1	23	$26.50	$28.71	$2.21	2	46	$38.25	$37.75	-$0.50	376	368	10,755
Apr	2	51	$25.46	$26.51	$1.05	3	66	$37.27	$40.03	$2.77	368	352	84,098
May	1	28	$24.60	$25.07	$0.47	3	68	$36.19	$43.16	$6.97	440	304	149,942
Jun	4	120	$26.93	$20.15	-$6.78	1	18	$42.80	$48.85		368	352	-299,286
Jul	5	130	$27.27	$25.81	-$1.46	7	162	$46.44	$57.79	$11.34	408	336	540,012
Aug	5	130	$27.27	$21.71	-$5.56	7	162	$46.44	$44.95	-$1.49	392	352	-368,488
Sep	13	271	$25.02	$20.87	-$4.14	12	272	$40.31	$38.39	-$1.92	384	336	-607,161
Oct	13	249	$26.59	$26.41	-$0.18	14	351	$37.86	$35.42	-$2.44	424	320	-293,643
Nov	14	269	$26.64	$24.72	-$1.92	14	351	$37.86	$34.28	-$3.58	416	304	-597,452
Dec	14	349	$27.04	$23.91	-$3.12	15	371	$37.82	$34.11	-$3.71	408	336	-907,430
Net 2011 Benefit to Customers													-$2,316,715

Source: Information Response 303, www.theice.com, and Schumaker & Company analysis

Exhibit III-31
Net 2011 Customer Benefits of MISO IND Hub "Sell" Power Transactions as of December 31, 2011

2011 SELL TRANSACTIONS AT MISO IND HUB													
	Off-Peak Power					Peak Power					Monthly Hours		
	Number of Trades	Allocated MWs Sold	Weighted Avg Selling Price	Weighted IND Hub Avg Market Price	Benefit to Customers	Number of Trades	MWs Sold	Weighted Avg Price Paid	Weighted IND Hub Avg Market Price	Benefit to Customers	Off-Peak	Peak	Dollar Benefit to Customer
Calculations >>		(1)	(2)	(3)	(4) = (3-2)		(5)	(6)	(7)	(8) = (7-6)	(9)	(10)	(1*4*9) + (5*8*10)
Jan	0	0		$31.86	-$31.86	0	0		$45.39	-$45.39	424	320	0
Feb	0	0		$26.78	-$26.78	2	14	$41.00	$37.54	$3.46	368	304	14,729
Mar	0	0		$28.71	-$28.71	0	0		$37.75	-$37.75	376	368	0
Apr	0	0		$26.51	-$26.51	0	0		$40.03	-$40.03	368	352	0
May	2	10	$25.00	$25.07	-$0.07	0	0		$43.16	-$43.16	440	304	-311
Jun	0	0		$20.15	-$20.15	0	0		$48.85	-$48.85	368	352	0
Jul	0	0		$25.81	-$25.81	1	23	$48.05	$57.79	-$9.74	408	336	-75,257
Aug	1	12	$28.75	$21.71	$7.04	4	48	$17.82	$44.95	$2.87	392	352	81,517
Sep	1	25	$25.15	$20.87	$4.28	4	36	$38.88	$38.39	$0.49	384	336	46,973
Oct	1	14	$26.95	$26.41	$0.54	3	72	$36.08	$35.42	$0.67	424	320	18,610
Nov	2	56	$26.43	$24.72	$1.70	1	13	$38.70	$34.28	$4.42	416	304	57,129
Dec	3	126	$27.57	$23.91	$3.66	1	13	$38.70	$34.11	$4.59	408	336	208,175
Net 2011 Benefit to Customers													$351,565

Source: Information Response 303, www.theice.com, and Schumaker & Company analysis

Exhibit III-32
Net 2011 Customer Benefits of PJM AD Hub "Buy" Power Transactions
as of December 31, 2011

2011 BUY TRANSACTIONS AT AD HUB PJM													
	Off-Peak Power					Peak Power					Monthly Hours		
	Number of Trades	Allocated MWs Purchased	Weighted Avg Price Paid	Weighted IND Hub Avg Market Price	Benefit to Customers	Number of Trades	Allocated MWs Purchased	Weighted Avg Price Paid	Weighted AD Hub Avg Market Price	Benefit to Customers	Off-Peak	Peak	Dollar Benefit to Customer
Calculations >>		(1)	(2)	(3)	(4) = (3-2)		(5)	(6)	(7)	(8) = (7-6)	(9)	(10)	(1*4*9) + (5*8*10)
Jan	0	0		$31.86	$31.86	0	0		$48.64	$48.64	424	320	0
Feb	2	50	$34.11	$26 78	-$7.32	1	20	$43.75	$40.15	-$3.60	368	304	-156,593
Mar	2	21	$31 00	$28 71	-$2 29	3	31	$37 77	$10.34	$2 56	376	368	11,194
Apr	0	0		$26 51	$26.51	0	0		$41 86	$41 86	368	352	0
May	0	0		$25.07	$25.07	0	0		$51.38	$51.38	440	304	0
Jun	3	77	$31 34	$20.15	-$11.19	1	19	$47 80	$56 06		368	352	-317,029
Jul	0	0		$25.81	$25.81	2	63	$52 60	$68 59	$15 99	408	336	338,477
Aug	0	0		$21 71	$21.71	2	16	$53.86	$44 04	-$9 82	392	352	-55,304
Sep	5	233	$30.48	$20.87	-$9.60	8	244	$44.03	$38.36	-$5 67	384	336	-1,323,860
Oct	8	247	$30.82	$26.41	-$4.41	14	253	$39.79	$38.98	-$0.82	424	320	-527,914
Nov	9	226	$31.84	$24.72	-$7.12	14	251	$39.71	$39.39	-$0.32	416	304	-693,612
Dec	11	296	$33.01	$23 91	-$9 10	12	270	$41.77	$36 16	-$5.61	408	336	-1,607,342
Net 2011 Benefit to Customers													**-$4,331,983**

Source: Information Response 303, www.theice.com, and Schumaker & Company analysis

Exhibit III-33
Net 2011 Customer Benefits of PJM AD Hub "Buy" Power Transactions
as of December 31, 2011

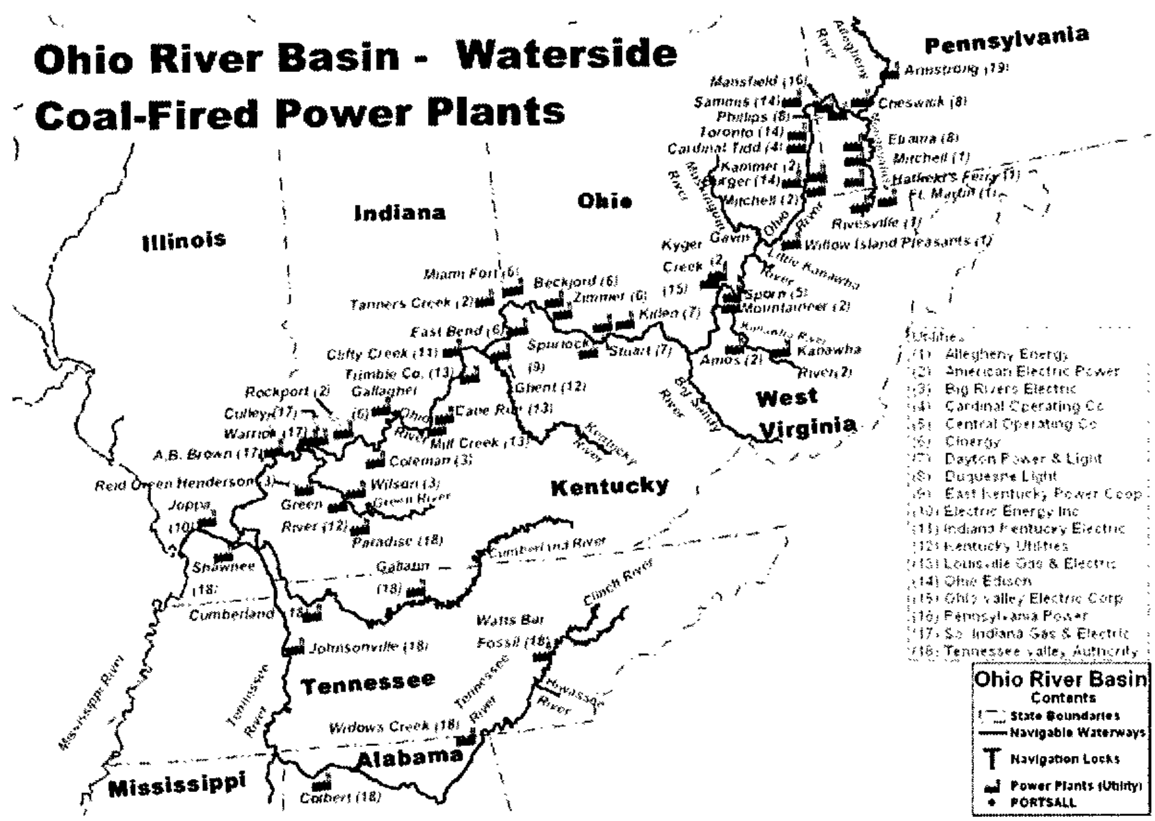
2011 SELL TRANSACTIONS AT AD HUB PJM													
	Off-Peak Power					Peak Power					Monthly Hours		
	Number of Trades	Allocated MWs Sold	Weighted Avg Selling Price	Weighted IND Hub Avg Market Price	Benefit to Customers	Number of Trades	MWs Sold	Weighted Avg Price Paid	Weighted AD Hub Avg Market Price	Benefit to Customers	Off-Peak	Peak	Dollar Benefit to Customer
Calculations >>		(1)	(2)	(3)	(4) = (3-2)		(5)	(6)	(7)	(8) = (7-6)	(9)	(10)	(1*4*9) + (5*8*10)
Jan	0	0		$31.86	-$31.86	0	0		$18.61	-$18 64	424	320	0
Feb	2	50	$33.86	$26.78	$7.07	2	43	$43 90	$40 15	$3 75	368	304	179,139
Mar	2	21	$30.95	$28.71	$2.24	9	133	$38 75	$40 34	-$1 58	376	368	-59,810
Apr	1	28	$29 25	$26.51	$2.74	5	69	$39.76	$41.86	-$2.10	368	352	-22,838
May	1	28	$29 25	$25.07	$4 18	3	68	$38 84	$51.38	-$12.55	440	304	-207,867
Jun	6	162	$30 94	$20.15	$10.79	6	94	$45 32	$56.06	-$10 74	368	352	287,860
Jul	3	104	$32 54	$25.81	$6 73	8	205	$50.41	$68 59	-$18.18	408	336	-966,680
Aug	3	104	$32 54	$21.71	$10 83	8	146	$49 76	$44 04	$5 72	392	352	735,685
Sep	13	445	$30.30	$20.87	$9 42	17	494	$44.26	$38 36	$5.90	384	336	2,589,135
Oct	18	458	$31.18	$26.41	$4 77	24	537	$40.62	$38.98	$1 64	424	320	1,208,323
Nov	22	468	$31 75	$24.72	$7.03	26	561	$40.47	$39.39	$1.08	416	304	1,552,757
Dec	24	569	$32 73	$23.91	$8.81	25	610	$41.48	$36.16	$5.33	408	336	3,137,429
Net 2011 Benefit to Customers													**$8,433,133**

Source: Information Response 303, www.theice.com, and Schumaker & Company analysis

Finding III-14 **The prices (cents per MMBtu) that Duke Energy Ohio paid for delivered coal during 2011 continues to be typical of the prices other utilities paid for coal for the generating plants they had along the Ohio River.**

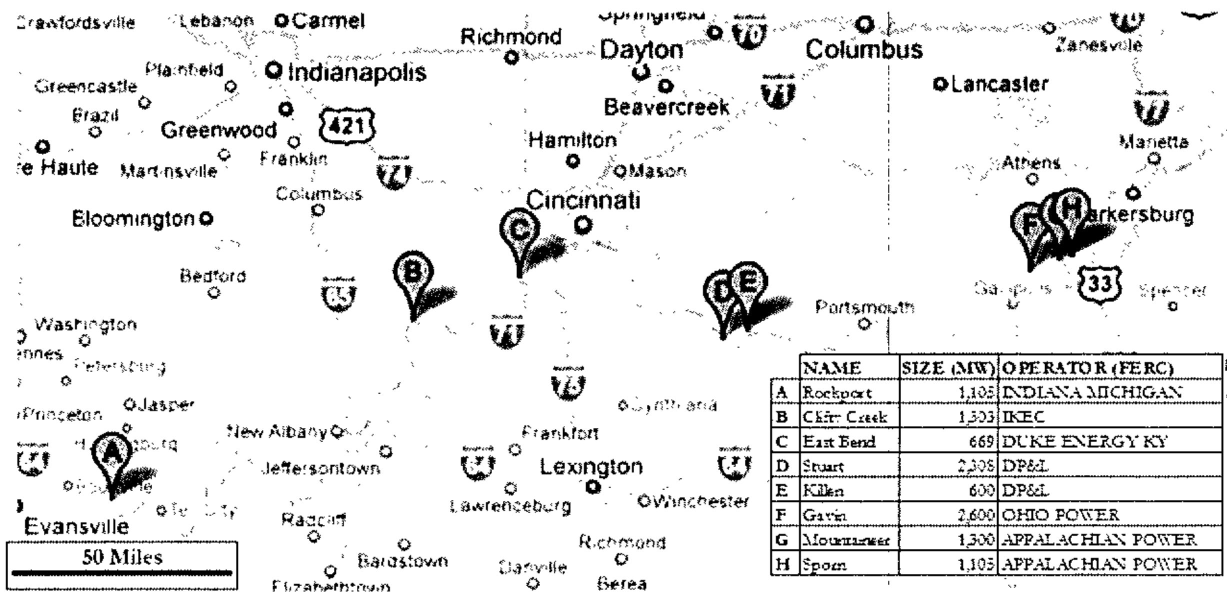
January to November 2011 monthly coal cost data reported to the United States Energy Information Agency (EIA) was downloaded from the EIA website. December 2011 data was not currently available. The same eight (8) plants along the Ohio River used for the 2009 and 2010 audits were used for the 2011 comparisons. *Exhibit III-34* shows all the potential comparison candidates available in the Ohio River Basin. *Exhibit III-35* shows the locations of the plants selected.

Exhibit III-34
Coal-Fired Waterside Power Plants in the Ohio River Basin
as of December 31, 2011



Source: http://outreach.lrh.usace.army.mil/Industries/Coal/default.htm

Exhibit III-35
Location of Generating Stations Used for Duke Energy Ohio Coal Cost Comparison
as of December 31, 2011

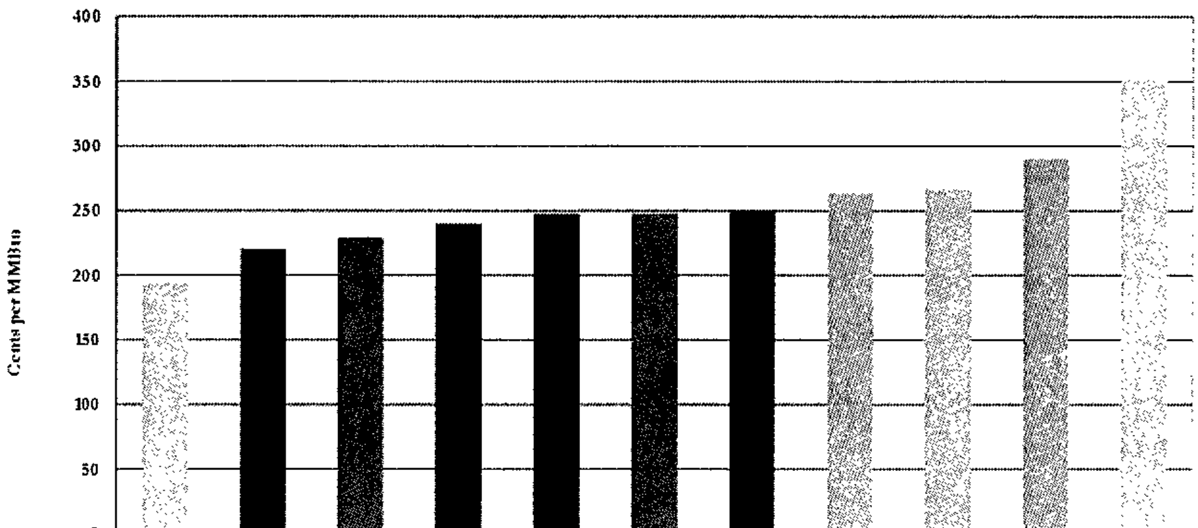


	NAME	SIZE (MW)	OPERATOR (FERC)
A	Rockport	1,105	INDIANA MICHIGAN
B	Clifty Creek	1,303	IKEC
C	East Bend	669	DUKE ENERGY KY
D	Stuart	2,308	DP&L
E	Killen	600	DP&L
F	Gavin	2,600	OHIO POWER
G	Mountaineer	1,300	APPALACHIAN POWER
H	Sporn	1,105	APPALACHIAN POWER

Source: Schumaker & Company analysis and Google Maps

Zimmer station moved from second lowest cost in 2010 to forth in 2011. Beckjord moved from sixth to fifth and Miami Fort moved from seventh to sixth in the panel. The rankings, from lowest to highest cost, of Duke Energy Ohio's three (3) plants along with the other eight (8) plants is given in *Exhibit III-36*. *Exhibit III-37* provides a view of the rankings from lowest to highest sulfur content of coal.

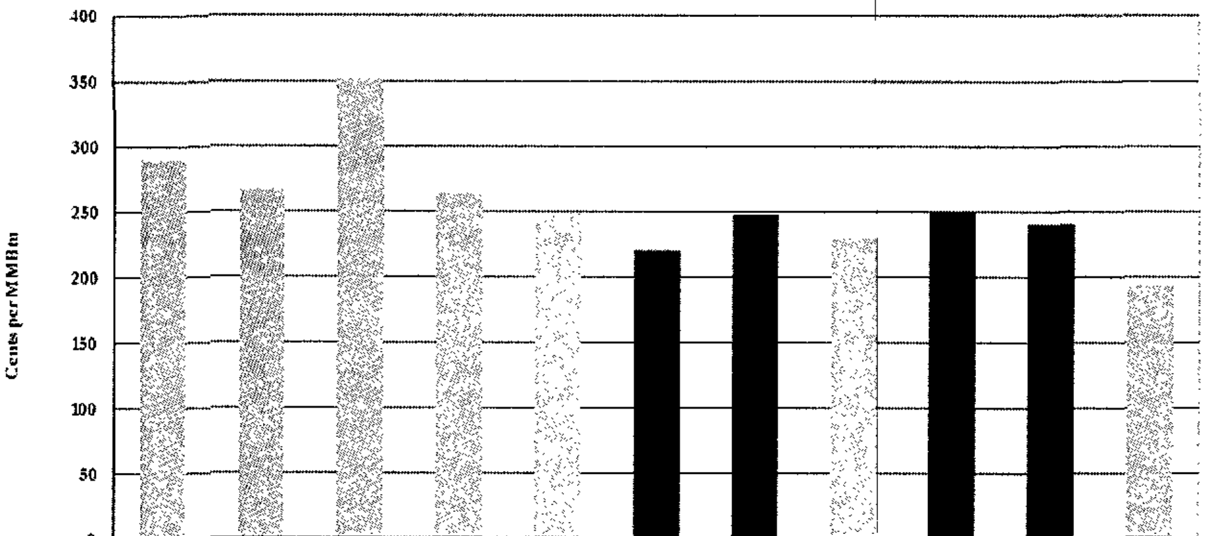
Exhibit III-36
Lowest to Highest Cents/MMBtu Cost Comparison
January to November 2011



	Gavin	East Bend	Mountaineer	Zimmer	Beckjord	Killen	Miami Fort	Stuart	Clifty Creek	Sporn	Rockport
Cents / MMBtu	193	220	230	240	248	249	251	264	267	291	353
% Sulfur	4.03	3.04	3.14	3.62	3.06	2.77	3.39	1.94	0.88	0.86	0.96
Tons (Millions)	5.26	1.84	2.24	2.79	1.44	1.64	2.87	5.13	4.96	0.35	0.75

Source: 2011 EIA Form 923 and Schumaker & Company analysis

Exhibit III-37
Lowest to Highest Sulfur Content Comparison of Cents/MMBtu Cost
January to November 2011



	Sporn	Clifty Creek	Rockport	Stuart	Killen	East Bend	Beckjord	Mountaineer	Miami Fort	Zimmer	Gavin
Cents / MMBtu	291	267	353	264	249	220	248	230	251	240	193
% Sulfur	0.66	0.88	0.96	1.94	2.77	3.04	3.06	3.14	3.39	3.62	4.03
Tons (Millions)	0.35	4.96	0.75	5.13	1.64	1.84	1.44	2.24	2.87	2.79	5.26

Source: 2011 EIA Form 923 and Schumaker & Company analysis

C. Recommendations

None

IV. Power Plant Performance

A. Background

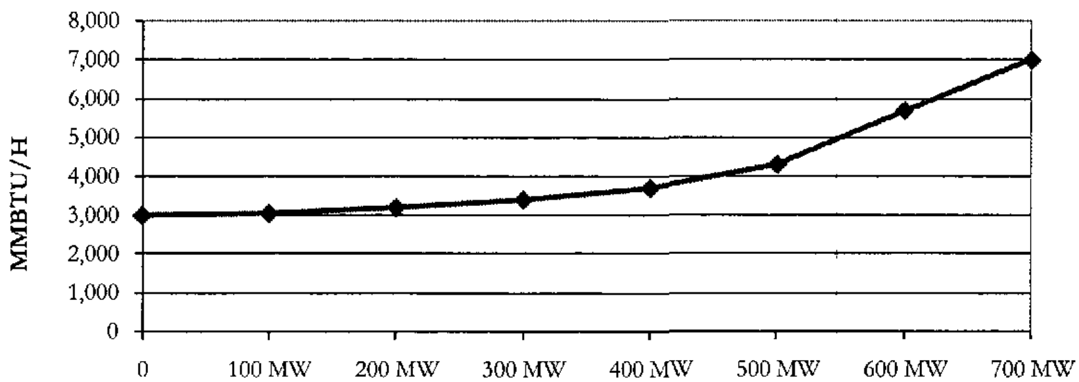
Utility Economic Dispatch 101

To completely understand some of the issues in power plant performance, one must have a working knowledge of power plant operating characteristics. One must also understand how power plants are loaded to conform with the principles of economic dispatch.

Power Plant Models

All power plants can be modeled via an input-output curve or, in the case of thermal plants, by what is also called a heat curve. Such a curve is shown in *Exhibit IV-1*.

Exhibit IV-1
Illustrative Input-Output Curve



Source: Schumaker & Company Illustration

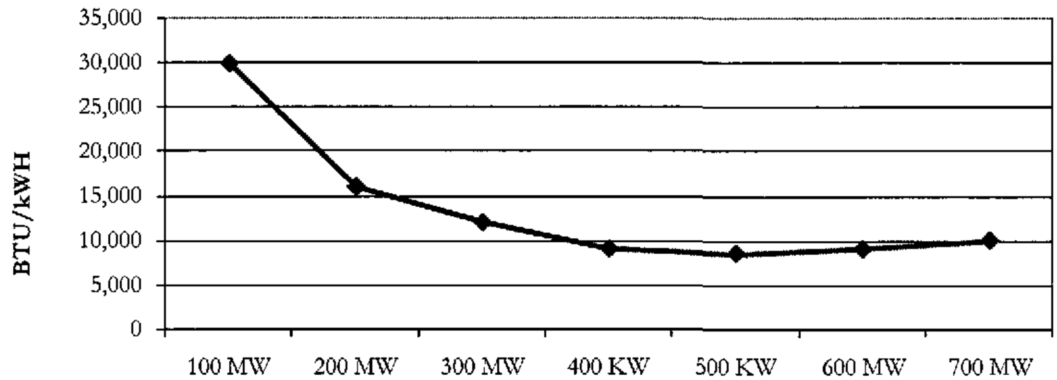
The industry practice is to obtain test results from various turbine throttle valve settings (valve point data) and to then model the unit's input-output curves as a smooth polynomial function (F):

$$F(P) = A + (B * P) + (C * P^2) + (D * P^3),$$

where F is the unit's thermal input in million British thermal units (BTUs) per hour (MMBtu/hour); P is the unit's net output power in megawatts (MWs); and A, B, C, and D are constants obtained by curve fitting to the valve point data (discussed above). Once this input-output curve has been developed, two additional curves can be represented: specifically, the unit's average heat curve, as shown in *Exhibit IV-2;* and the unit's incremental heat rate curve, as shown in *Exhibit IV-3.*

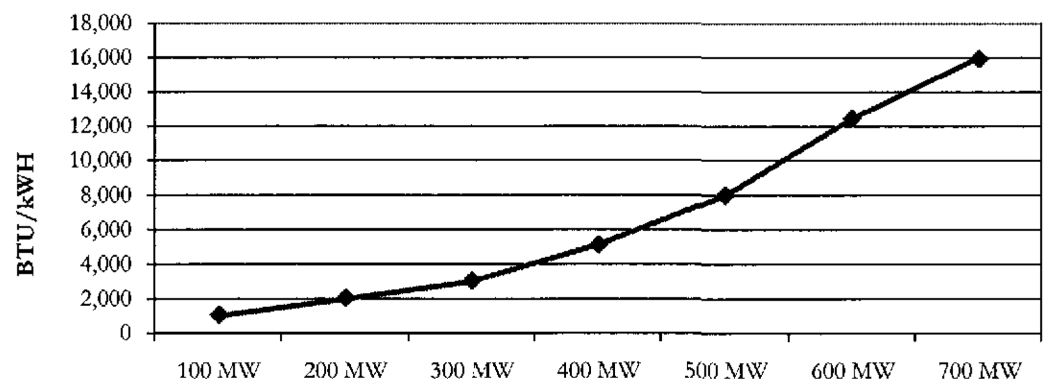
Both of these curves are represented in BTU per kilowatt hour (BTU/kWh). In mathematical terms, the unit's incremental heat rate curve is the first derivative of the unit's input-output curve or heat curve.

Exhibit IV-2
Illustrative Average Heat Curve



Source: Schumaker & Company Illustration

Exhibit IV-3
Illustrative Incremental Heat Curve



Source: Schumaker & Company Illustration

The input-output curve shown in *Exhibit IV-1* is for "best conditions" (i.e., when the unit's components are at their best thermodynamic performance levels and the unit's human operator is performing his or her duties as best he or she can). If any component or the operator is performing at less than best, then for each output level, the unit will consume more heat input than that which is shown in *Exhibit IV-1*.

One example of the impact of the operator's performance is the control of "excess air." Normal atmospheric air is approximately 20% oxygen (O_2). Each boiler fuel has some minimum amount of oxygen that is necessary to complete combustion. Typical boiler design is such that the hot exhaust gas from a boiler should be at about 2% oxygen (O_2). Levels of O_2 that are less than 2% generally indicate the inefficiency of less-than-complete fuel combustion. These levels may also may indicate the risk of a buildup of carbon monoxide gas (CO)—a situation that can result in a catastrophic explosion of the boiler. On the other hand, levels of O_2 that are higher than 2% generally indicate the inefficiency of excess air input to the boiler. The excess air mass consumes extra fuel by being uselessly heated. In addition, the excess air is accompanied by higher-than-necessary gas flow velocities in the boiler, thereby bringing the hot gas in contact with the boiler's tubes for a shorter time than is optimal and transferring less heat content to the boiler's fluid.

Many utilities have operator-performance monitoring programs that monitor plant performance over a period of time. For instance, for a certain time period, a unit is monitored and a computer then calculates what its input heat consumption could have been, under best operator performance, versus what its actual heat consumption was for the operator's shift. The difference in heat is priced at the fuel's cost rate and the dollar value of that difference is brought to the operator's attention as part of a continuous operator-performance training program.

At some utilities, the monitoring of the thermodynamic performance of a unit's components is the responsibility of Results Engineering. One example of a results engineer's work is condenser back pressure. The spent fluid that has already passed through the unit's turbine is then passed through a condenser to reduce its heat content and, in turn, its volume. (The reduced volume of fluid takes less energy to be pumped back into the boiler to repeat the work cycle.) As the condenser ages in service, it "fouls" (i.e., undesirable material builds up around its tubes). This buildup results in a reduction in the condenser's heat-transfer capabilities, a decrease in the unit's fluid volume reduction, and an increase in the condenser's back pressure. The turbine sees a net pressure head equal to the difference between the boiler's output forward pressure and the condenser's input back pressure. Thus, the turbine extracts less energy from the same unit expenditure of fuel.

The results engineer monitors the performance of the unit's components (like the condenser) and calculates the optimal time to take each component (or the entire unit) out of service for maintenance to restore best-condition performance efficiency. The optimal time is when the present value of the savings from restored performance exceeds the investment cost of the maintenance procedure.

All of these activities occur at the power plant, but the results (performance curves, etc.) are used within power plant dispatching to ensure proper economic dispatch, as discussed in the next section.

Power System Models

Economic dispatch of power plants is the real-time control process of an electric utility's units, whereby customer demand is matched by generation supply in the least costly (optimal) way possible. The instantaneous consumption of electricity by individual utility customers is variable and volatile. Taken together, the sum total of the customer consumption is the demand the utility must match. Since electricity cannot be stored, the utility must control, at each moment in time, the output supply from all of its generation units. That way, it can match the demand plus it can set aside a small additional amount for the power lost in transmission between the generation plants and the customers. This control process—matching the supply with the demand—is called "regulation."

Each interconnected utility, in negotiation with its neighbors, has established its "control area," which will generally conform to its franchise service territory. The utility installs instrumentation to measure the power flows on each transmission line that interconnects its control area with any other utility's control area. These interconnection transmission lines are called "tie-lines." Each utility has a facility, called a "control center" or a "dispatch center," where the tie-line measurements are received and interpreted by the utility's system controllers, coordinators, or dispatchers. The system controllers are people who, assisted by a real-time computer system, monitor the utility's match between demand and supply by observing the net (sum total) tie-line flow. They observe that:

- If the net tie-line power flow is zero, then the customer demand within the control area is exactly matched by the utility's generation supply.
- If the net power flow is positive (out), then supply exceeds demand and generation needs to be reduced.
- If the net power flow is negative (in), then demand exceeds supply and generation needs to be increased.

Another indicator of the utility's matching of demand by supply is the instantaneous rate of change in alternating current (AC) frequency shown by the system. If demand exceeds supply, then kinetic energy will be drawn out of the synchronous alternators to make up the shortage. The alternators will then slow down and cause a decrease in system frequency. If supply exceeds demand, then kinetic energy will be built up in the machines and system frequency will increase. This frequency behavior, coupled with the net tie-line flow, provides a control indicator, called the system's Area Control Error (ACE) signal. The ACE is calculated as a linear combination of the net tie-line flow and the system frequency departure.

Unit Running Costs

A utility's control center continually acts to match the customer demand with generation supply, but with many units available, this match can be made in many different ways. Suppose the utility needs one more megawatt of generation output to achieve match. Which of its several units should be selected to increase its output by one MW? The answer is whichever unit can provide the cheapest next one megawatt.

As previously discussed, a thermal unit has an input-output function, F, such that for an output of P megawatts, the unit consumed an input of F(P), measured in MMBtu/hour. Each unit has a cost for fuel that can be represented as \$/MMBtu, which in turn can be represented as f. Therefore, the cost rate incurred when we generate P megawatts is $f(F(P))$, measured in \$/hour. Similarly, for P+1 megawatts, the cost rate is $f(F(P+1))$. The cost rate of the extra one MW is therefore $f(F(P+1) - F(P))/1$ MW, measured in \$/megawatt hour (MWh). Carried to the logical limit, this means that the marginal cost rate for any small increase in power output is the derivative of $f(F(P))$ (i.e., $f(F'(P))$), where F' is the unit's incremental heat rate.

The application of the thermal units' marginal cost rate, $f(F'(P))$, is as follows:

- Whenever regulation requires an increase in generation to match load, the system controller (or coordinator or dispatcher) should dispatch (assign or allocate) that increase to whichever unit has the lowest marginal cost rate.
- Whenever regulation requires a decrease in generation, that decrease should be dispatched to whichever unit has the highest marginal cost rate.
- Whenever regulation indicates that no change in generation is needed and two generation units have different marginal cost rates, then the dispatch function should decrease the more expensive unit and increase the cheaper unit. Doing so will keep the total size of the generation the same but will save the cost difference between the two units.

In short, this dispatch procedure will eventually cause each unit to achieve an identical marginal cost rate.

System Lambda

The end result of having every generation unit at an identical marginal cost rate is so significant to the operation of a utility that it is useful to derive that result from a formal point of view. Consider a utility with several generation units available. Number them 1, 2 , ..., N. The customer demand, D, must be matched by the units' sum total generation. That is:

$$D = P_1 + P_2 + ... + P_N,$$

where P_i is the net power output from the i^{th} unit.

The cost rate to the utility to match the demand is C:

$$C = f_1(F_1(P_1)) + f_2(F_2(P_2)) + ... + f_N(F_N(P_N)),$$

where f_i is the fuel cost rate for the i^{th} unit and F_i is that unit's input-output function.

The question is: What values of P_1, P_2, ..., P_N should we select to minimize the cost rate C? Using the technique of Lagrange Multipliers, these equations can be solved, but such calculations fall beyond the scope of what needs to be discussed here. Because this classic derivation of the necessary condition for thermal-unit fuel-cost optimization involves the Lagrange Multiplier, "lambda," the industry has come to speak of the result as "system lambda."

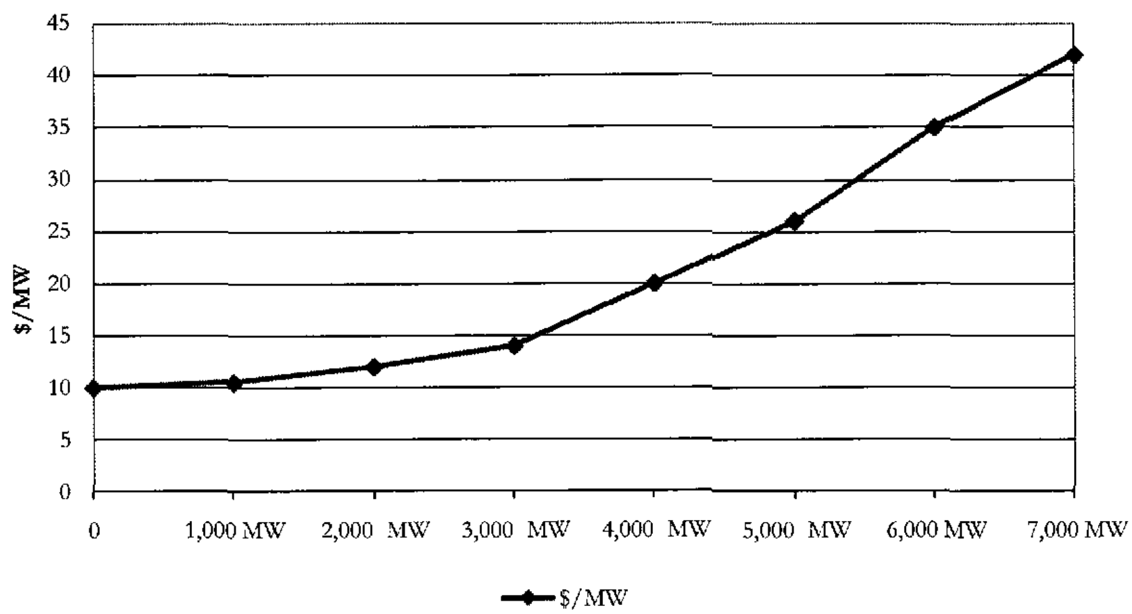
System lambda (λ) is a marginal cost rate, in \$/MWh, for the production of electrical power. System lambda is the marginal cost rate for the entire utility production system because the mathematical result is every unit being at an identical marginal cost rate, or λ.

There are exceptions to the "every unit at system lambda" rule. These are:

- ***High Limit Units*** – A unit whose marginal cost is very low, to the point that it would be desirable to generate additional power output from it, but which has already reached its point of maximum power output (i.e., every valve is wide open) will have topped out at a marginal cost rate below system lambda.
- ***Low Limit Units*** – A unit whose marginal cost is very high, to the point that less power output is desired from it, but which has already reached its point of minimum power output (i.e., to go lower would require shutdown to remove the unit from the system) will display a marginal cost rate above system lambda.
- ***Load Support*** – In some cases, a unit may be required to support the load within the given areas for load or transient instability support.

One result of these solutions is the determination of the utility's system lambda vs. load curve, as shown in *Exhibit IV-4*. Note that lambda is a monotonically increasing function of load (i.e., each extra block of power costs more than the blocks that preceded it). Thus, economic dispatch adds power in layers of increasing cost.

Exhibit IV-4
Illustrative System Lambda Curve



Source: Schumaker & Company Illustration

Utilities' management of the response to increase incremental costs is the essence of economic dispatch. Such response needs to be based on sound engineering as well as financial principles and data being integrated into real-time computer systems. Such a foundation provides real-time traders and dispatchers with the ability to properly operate the electrical system so as to minimize costs.

Plant Performance Availability

The Net Capacity Factor (NCF) is a measure of the loading or usage of an electric generating unit. It is defined as follows:

$$NCF = \frac{\text{Net Actual Generation (NAG)} \times 100\%}{(\text{Period Hours (PHs)} \times \text{Net Maximum Capacity (NMC)})},$$

where:

- NAG is the actual electrical output by the unit during the period being considered, net of any electrical usage by the plant.
- PH is the time period over which the electrical output is measured.
- NMC is the capacity the unit can sustain over a specified period, when not restricted by ambient conditions or equipment deratings, minus the losses associated with station service or auxiliary loads.

NCF is a measure of the usage of a generating unit over a period of time. The key factors determining the usage of that unit are:

1. The availability of the unit to operate
2. The need for the electrical energy that can be generated
3. The economic costs associated with the electrical energy (i.e., Is the unit "in the money" compared to other generation sources?)

The first item above deals with the availability of the unit to operate, and the industry has developed another factor that specifically measures that capacity factor component. This factor is referred to as the Equivalent Availability Factor (EAF), which is defined as:

$$EAF = \text{Available Hours (AHs)} - (EUDH + EPDH + ESDH)/\text{Period Hours (PH)} \times 100\%,$$

where:

- AH is the sum of hours the unit was operating in a period.
- EUDH – Equivalent Unplanned Derated Hours – is the product of the unplanned derated hours and the size of the reduction divided by the Net Maximum Capacity.
- EPDH – Equivalent Planned Derated Hours – is the product of the planned derated hours and the size of the reduction divided by the Net Maximum Capacity.
- ESDH – Equivalent Seasonal Derated Hours – is the product of the seasonal planned derated hours and the size of the reduction divided by the seasonal Net Maximum Capacity.

Although this may appear to be a fairly complicated formula, it can be more succinctly shown in the following example.

If a 400 MW unit (400 MW Net Maximum Capacity) is generating 300 MW to meet a load requirement but incurs a partial derating of 40 MW for an hour, then:

$$EAF = (400 - 40)/400 \times 100\% = 90\%$$
$$NCF = 300/400 \times 100\% = 75\%$$

Another way of looking at these factors is that they represent the average of all the hourly NCFs and EAFs over any given time period.

In summary, EAF is a clearer representation of the availability of the unit to serve load as a result of proper management of operating and maintenance procedures. In contrast, NCF, although a partial indication of operating and maintenance procedures, also includes the impact of items 2 and 3 above. If a plant is shut down for an outage during that time period, EAF and NCF are both 0 for the outage time period. Generally, it would be expected that EAF would always be a larger number than NCF.

B. Findings and Conclusions

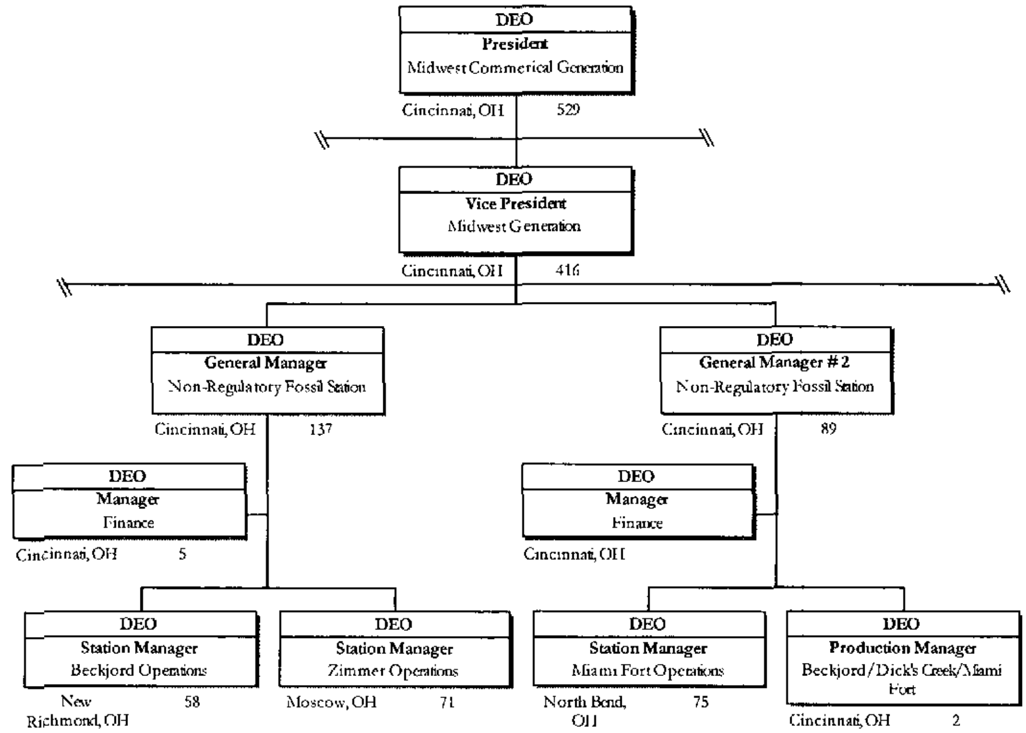
Finding IV-1 **Duke Energy Ohio's centrally managed Generation Operations and Generation Maintenance organizations continue to focus on standardization of processes to optimize the economic output of Miami Fort, Beckjord, and Zimmer power plants.**

During the latter half of 2010, Duke Energy Ohio separated the responsibilities for power plant activities among three (3) centrally managed organizations:

- Coal Logistics and Material Handling (see *Chapter V*)
- Operations
- Maintenance

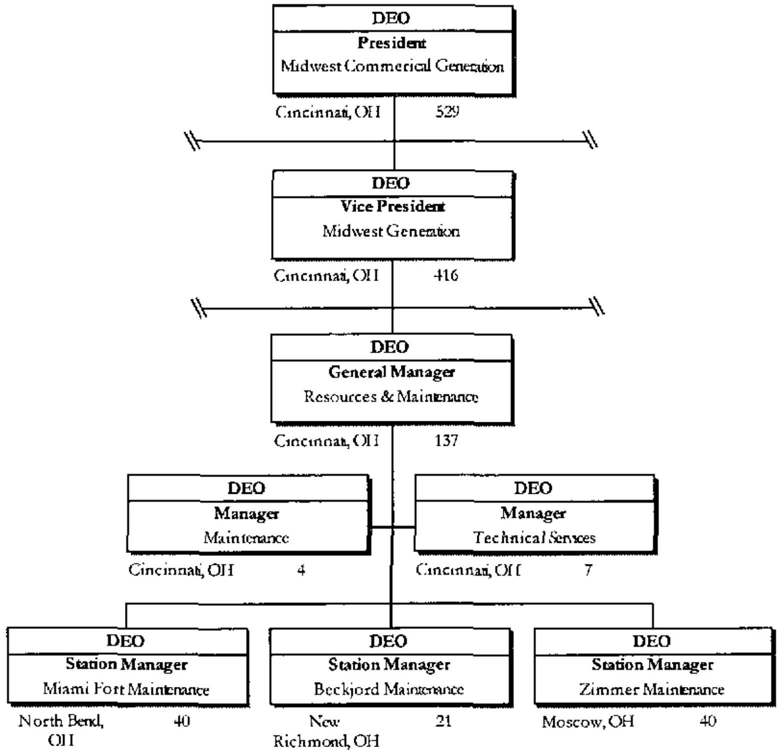
The Operations organization, *Exhibit IV-5*, is responsible for all activities associated with the hourly operation of the generating units. Maintenance of plant equipment, excluding fuel handling systems, is the responsibility of the Maintenance organization, *Exhibit IV-6*. Maintenance of the fuel handling systems is the responsibility of the Coal Logistics and Material Handling organization (see *Chapter V*).

Exhibit IV-5
Plant Operations Organization
as of December 31, 2011



Source: Information Responses 127 and 272 and Interviews 48, 54, 67, 69, and 70

Exhibit IV-6
Plant Maintenance Organization
as of December 31, 2011

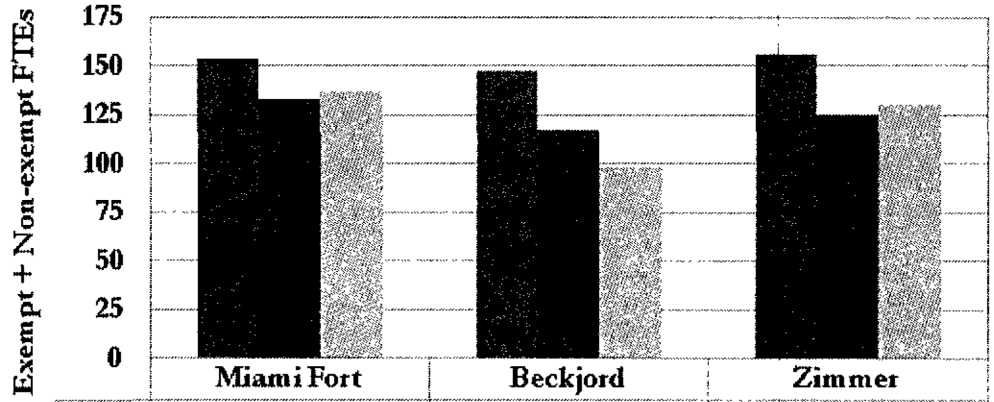


Source: Information Responses 127 and 272 and Interviews 48, 54, 67, 69, and 70

Finding IV-2 **Total plant staffing decreased 2.4% (9 exempt + non-exempt employees) in 2011 from 2010 levels.**

Plant staffing levels for 2009-2011 were analyzed by Schumaker and Company consultants. *Exhibit IV-7* compares the combined Operations, Maintenance, and Coal Handling exempt plus non-exempt staffing levels for year-end 2009-2011. Staffing during 2011 was increased by four (4) at Miami Fort, reduced by 19 at Beckjord, and increased by six (6) at Zimmer with a total staffing reduction of nine (9) from 2010. Overall plant operations do not appear to be significantly affected by the staffing changes.

Exhibit IV-7
Power Plant Staffing Comparisons
as of December 31, 2011



	Miami Fort	Beckjord	Zimmer
2009	154	147	156
2010	133	117	125
2011	137	98	131

Source: Information Response 218, 272, and 322

Finding IV-3 **Duke Energy Ohio continues to maintain an Energy Cost Manual that forms the basis for the dispatching curves.**

Schumaker & Company consultants reviewed the Energy Cost Manual, which is essentially an Excel spreadsheet workbook that has been developed over a number of years. It contains the information necessary to model plant heat curves in the form of the polynomial equations discussed in the preceding background. The Energy Cost Manual deals primarily with the variable costs that change with the operation of the unit (i.e., fixed costs are excluded). The dispatch curves include additional items such as actual fuel, coal tax credits, sulfur dioxide (SO_2) allowances, lime and limestone, and mercury (HG) allowances, such that the actual equations are of the form:

> \$/HR = Fuel + Tax Credits + SO_2 Allowances + Limestone + Mercury (HG) Allowances + NOx Allowances + Ammonia + VOMC/HR + VOMC/MWh,
>
> Where VOMC/HR is the variable operations and maintenance costs capital and VOMC/MWh is the variable operations and maintenance costs.

Not all of these factors are necessarily applicable to each unit at this time (e.g., mercury allowances). Where they are, however, a separate representation (formula) is incorporated to account for these costs if they might become a requirement.

These overall input-output equations do change over time for a unit, the exception being the case where the unit underwent extensive modification and/or upgrades. Changes that occur to the unit over time are accounted for through the application of a Thermal Performance Factor (TPF), which takes into account two primary considerations, specifically:

- A shape factor – the seasonal variation in performance due to primarily seasonal temperature and humidity changes
- A degradation factor – to account for the degradation in unit performance based on operating time between major overhauls.

The TPF is adjusted for each unit at the beginning of the year. In addition, the unit startup costs, unit no-load operating costs, and minimum and maximum loads are maintained in the Energy Cost Manual. The Energy Cost Manual formed the underlying source data for the resource offer, which was submitted to MISO and/or PJM for each operating day of the year. In essence, information from the Energy Cost Manual can be copied and pasted into the system used for submitting resource offers to regional transmission organizations.

Exhibit IV-8, *Exhibit IV-9*, and *Exhibit IV-10* present sample information maintained in the Energy Cost Manual.

Exhibit IV-8
Sample from Energy Cost Manual
as of December 8, 2011

[redacted]

Source: Information Response 293

Exhibit IV-9
Sample from Energy Cost Manual
as of December 8, 2011

[redacted]

Source: Information Response 293

Exhibit IV-10
Sample from Energy Cost Manual
as of December 8, 2011

[redacted]

Source: Information Response 293

Finding IV-4 **Duke Energy Ohio continues to use monthly and year-to-date key performance indicators (KPIs) to monitor power plant performance.**

Schumaker & Company consultants confirmed that generating station performance metrics used during 2010 continued to be used during 2011. A sample KPIs sheet is given in *Exhibit IV-11*. Management meetings are held each month to review KPI results and plans to meet targets.

Exhibit IV-11
Sample KPI Format used at Generating Stations
December, 2010

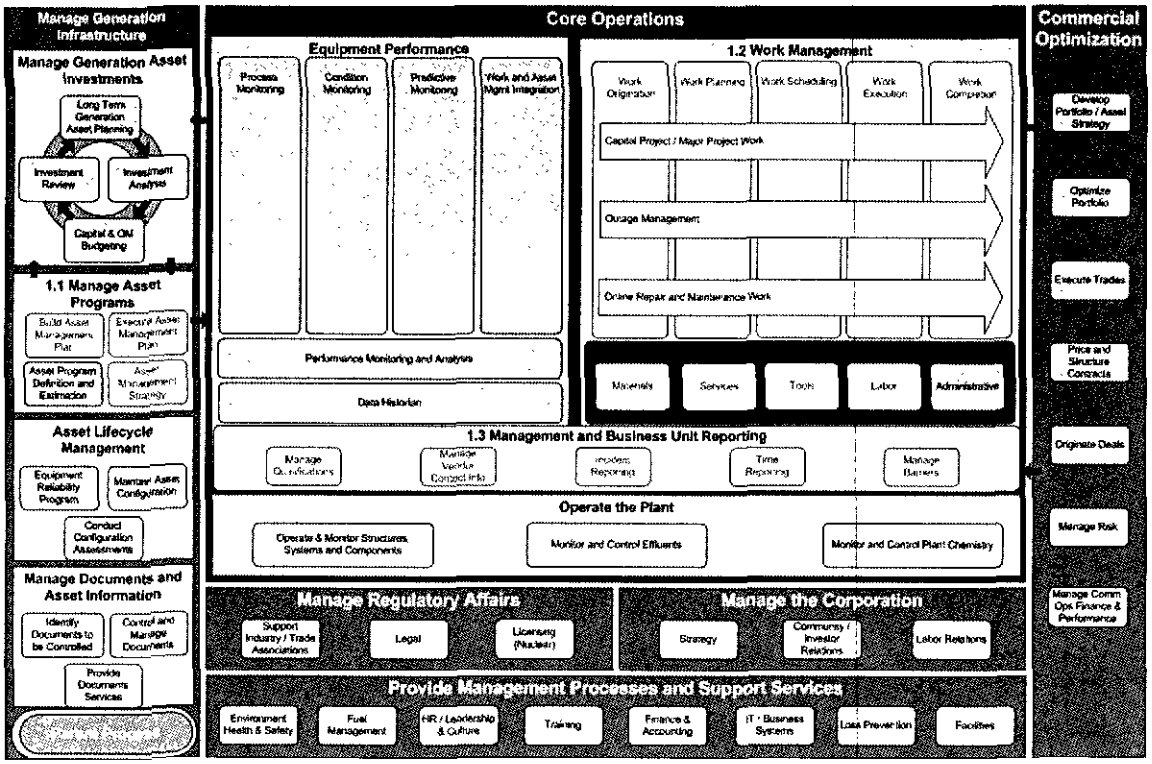
[redacted]

Source: Information Response 220

Finding IV-5 **Duke Energy Ohio continues to leverage the integration of the enterprise-wide eMax (Maximo) work management, PaSta work scheduling, and MyTime labor reporting systems to improve power plant performance during 2011.**

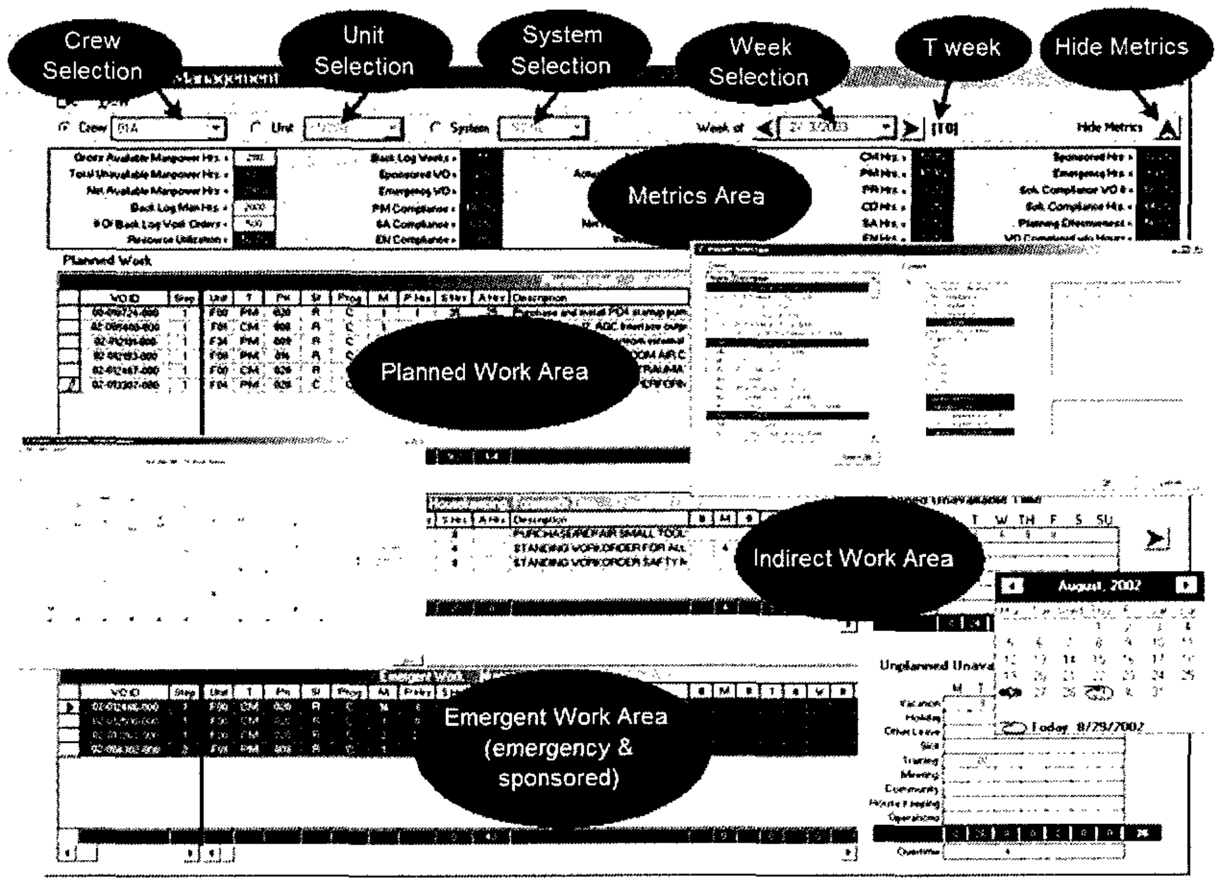
Schumaker and Company consultants viewed a demonstration of the use and integration of the work management, scheduling and labor reporting systems on March 8, 2011. *Exhibit IV-12* provides the process integration diagram for Maximo v6.2, known internally to Duke Energy as eMax. *Exhibit IV-13* shows an example PaSta screen that is used by work planners to schedule work orders to crews. The interfaces between labor reporting and eMax and PaSta are shown in *Exhibit IV-14*.

Exhibit IV-12
eMax Process Integration Diagram
2011



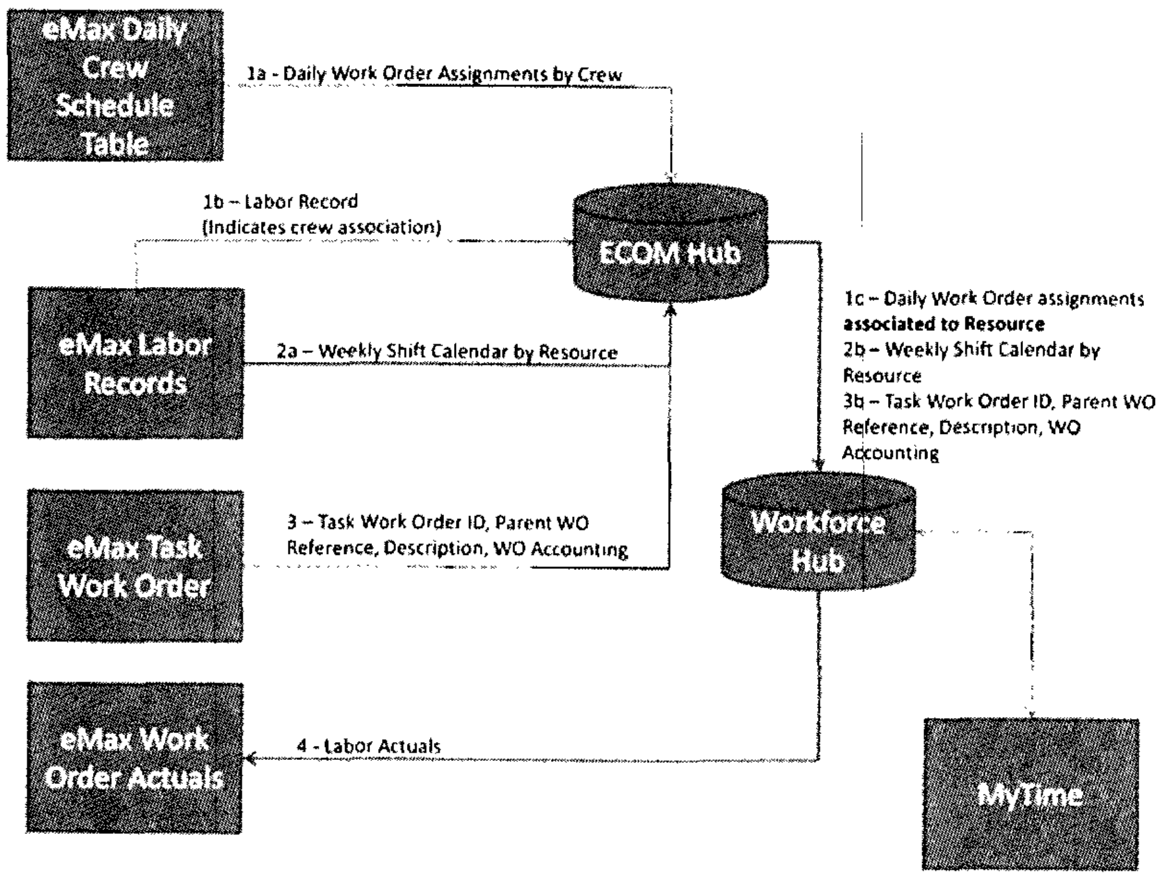
Source: Information Response 154

Exhibit IV-13
Example PaSta Screen
2011



Source: http://www.p-rosolutions.com/index_files/Tools01PaSTA.htm

Exhibit IV-14
eMax Integration Diagram with EAM/MyTime
2011



Source: Information Response 210

Finding IV-6 **Duke Energy Ohio monitors station work order and schedule attainment performance using eMax, PaSta, and MyTime data.**

Exhibit IV-15, *Exhibit IV-16*, and *Exhibit IV-17* give examples of reports used to monitor work order and schedule attainment during weekly staff meeting at each generating plant.

Exhibit IV-15
Scorecard
as of December 31, 2011

"The scorecard is a tool used for measuring, trending, and providing corrective measures to the health of the work management systems."

Duke Energy

Non-Reg Scorecard November, 2011

Crew	Schedule Compliance		Estimate vs. Actual		Emergent Work		PM Compliance	
Duke-A	81%	84%	1.16	0.43	13%	8%	90%	90%
Duke-C	80%	85%	0.47	0.23	14%	14%	100%	100%
Duke-FGD		N/A		0.49		N/A		N/A
Duke Total	*81%*	*85%*	*0.82*	*0.38*	*13%*	*11%*	*95%*	*95%*
C&K		N/A		0.04		N/A		N/A
Veolia	35%		0.82		0%		25%	
Solid	78%	N/A	1.55	N/A	4%	N/A	N/A	N/A
Sunbelt	25%	N/A	N/A	0.52	0%	N/A	N/A	N/A
Zachry	75%	N/A	0.70	1.13	16%	N/A	100%	N/A
Contract Total	**53%**		**1.02**	**0.57**	**5%**		**63%**	
Total	62%	85%	0.94	0.48	8%	11%	79%	95%
Grand Total	68%		0.69		9%		84%	

Source: Information Response 298

Exhibit IV-16
Weekly Work Order Completion Report
as of December 31, 2011

"The weekly report provides feedback to all station personnel for work orders completed during the previous week."

Today:
[illegible]

Completed Work Orders

Dates 11/28/2011 to 12/4/2011

	Type	P1	P2	P3	P4	P61	P62	P63	P54	Grand Total
Parent WO's	CM	3	1	0	10	0	0	0	0	14
	PM	0	0	0	124	0	0	0	0	124
	Safety	0	0	0	0	0	0	0	0	0
	Other	0	0	0	1	0	0	0	0	1
	Total	3	1	0	135	0	0	0	0	139
Task WO's	CM	7	5	1	29	0	0	0	0	42
	PM	0	0	0	124	0	0	0	0	124
	Safety	0	0	0	24	0	0	0	0	24
	Other	0	0	0	0	0	0	0	0	0
	Total	7	5	1	177	0	0	0	0	190
Grand Total		10	6	1	312	0	0	0	0	329

Source: Information Response 298

Exhibit IV-17
Forced Outage Scorecard
as of December 31, 2011

"The forced outage scorecard is a tool used for measuring, trending, and providing corrective outage management in order to maximize outage readiness and effectiveness."

SNO Outage Report Card							Duke Energy
Station:							
Unit:							Comments
Forced Event:	SNO Outage			Overall:	77%	C	
Start Date:	[illegible]						
End Date:	[illegible]			Rolling Average:	77%	C	
Duration (hrs)	97.8	4.1 Days					
Preparation				Grade	100%	A	
Technical Coordinator Rank	Priority	Planned			Compliance		Comments
A	100%	100%	[illegible]		100%	[illegible]	
B	100%	100%	[illegible]		100%	[illegible]	
C	100%	100%	[illegible]		100%	[illegible]	
	Planned Hrs	Act. Hrs	Result	Target	Compliance		
Planning	415.0	477.0	0.87	.85 to 1.15	100%	[illegible]	
Schedule Compliance				Grade	67%	D	
	WO's	Comp WO's	Result	Target	Compliance		Comments
Scheduled	20	20	100%	100%	100%	[illegible]	
Break-in's	15	15	100%	100%	100%	[illegible]	
Break-in %			43%	10%	0%	[illegible]	
Execution				Grade	66%	D	
	Earned Hrs	Act. Hrs	Result	Target	Compliance		Comments
Productivity Factor	415.0	1031.5	0.40	1.0	40%	[illegible]	
Completion Target [illegible]	89.1	97.8	LATE	100%	91%	[illegible]	

Source: Information Response 298

Finding IV-7 Duke Energy Ohio unit operators record each event that affects unit output.

Duke Energy Ohio, as all other electric utilities in the United States, reports unit operating data to North American Electric Reliability Corporation (NERC) to track historical performance of electric generation units using Generation Availability Data System (GADS). Duke Energy Ohio uses internal logs that are completed by unit operators to collect the data submitted to NERC. *Exhibit IV-18* gives an example of the data documented by unit operators.

Exhibit IV-18
Sample Operator Log
2011

Zimmer Station - Zimmer 1

Duration hours. Equiv. Hours and MWHr cover the chosen period only

Unit	Event	Type	Start	End	GAC	NAC	Duration	Equiv Hrs	Equiv MWH	Cont	Work Start	Work End	Hours
Zimmer 1	1	U2	1/1/2011 0:00	1/3/2011 1:21	0	0	49.35	49.35	64154.956	1			0
			CAUSE CODE: 1330 - BOILER TUBE SLAG FALL DAMAGE									AMP CODE:	T2
			DESCRIPTION: Tube leak in bottom slope from a slag fall										
Zimmer 1	2	U1	1/4/2011 3:21	1/7/2011 4:25	0	0	73.06667	73.06667	94986.664	1			0
			CAUSE CODE: 1050 - SECOND SUPERHEATER LEAKS									AMP CODE:	T2
			DESCRIPTION: Tube leak in secondary superheat.										
Zimmer 1	3	D1	1/7/2011 20:08	1/8/2011 5:30	1379	1271	9.366667	0.208949	271.633	1			0
			CAUSE CODE: 0335 - PULVERIZER LUBE OIL SYSTEM									AMP CODE:	82
			DESCRIPTION: Mill #14 lube oil pump trip										
Zimmer 1	4	D1	1/8/2011 7:30	1/8/2011 14:15	1368	1260	6.75	0.207692	270	1			0
			CAUSE CODE: 0335 - PULVERIZER LUBE OIL SYSTEM									AMP CODE:	83

Source: Information Response 294

Finding IV-8 Power plant availabilities remained reasonable during 2011.

Schumaker & Company analyzed Equivalent Availability Factor (EAF) and Net Capacity Factor (NCF) for each of Duke Energy Ohio units for 2007-2011. Each week a unit is down for maintenance, the Equivalent Availability and Net Capacity Factors are lowered by approximately 2%.

Because most units that are operated fairly consistently and usually require anywhere from a two- to six-week outage each year, those outages alone can lower EAF and NCF by anywhere from 4% to 12%. Thus, a 90% EAF coupled with a 90% NCF would indicated that the units were performing very well during the audit period. A small spread between EAF and NCF would indicate that these units are "in the money" pretty much all the time. Industry averages for generating stations, shown in *Exhibit IV-22*, further support this conclusion.

Our review of the event summaries for each of the major generating stations (Zimmer, Beckjord, and Miami Fort) identified a number of unplanned outages related to wet coal. Zimmer experienced frozen coal in bunkers and an extended unplanned outage related to air preheater failures and super heater tube leaks.

The Equivalent Availability and Net Capacity Factors for Miami Fort Units 7 and 8 are shown in *Exhibit IV-19*. Unit 7's upward trend peaked in 2010 but reversed during 2011. Unit 8 continued its downward trend in 2011 after peaking in 2009.

Exhibit IV-19
Miami Fort Plant Performance
2007 to 2011

[redacted]

Source: Information Response 48, 150, and 292

Exhibit IV-20 provides the performance of the Beckjord units. Beckjord Units 1 through 3 are currently in an extended shutdown which began in 2010. Units 2 and 3 had to be operated for a very short period in 2011 to retain their operating licenses. Units 4, 5 and 6 did not perform as well as Miami Fort, and the spread between the EAF and NCF would indicate that they are not "in the money" as frequently as Miami Fort. Beckjord 5 and 6 underwent planned outages during 2011. Unit 5 and 6 Equivalent Availability Factors are near industry averages shown in *Exhibit IV-22*.

Exhibit IV-20
Beckjord Plant Performance
2007 to 2011

[redacted]

Source: Information Response 48, 150, and 292

Zimmer's performance, shown in *Exhibit IV-21*, improved in 2010 to pre-2009 levels and achieved industry levels (1000+ MW) shown in *Exhibit IV-22*. 2011 levels decreased to 2009 levels mainly due to unplanned outages caused by frozen coal early in the year and super heater tube leaks later in the year.

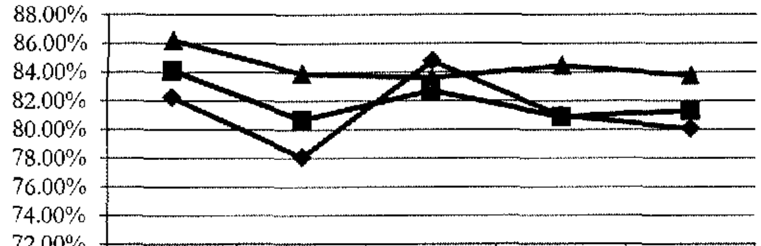
Exhibit IV-21
Zimmer Station Plant Performance
2007 to 2011

[redacted]

Source: Information Response 48, 150, and 292

Exhibit IV-22
Industry Averages
2006 to 2010

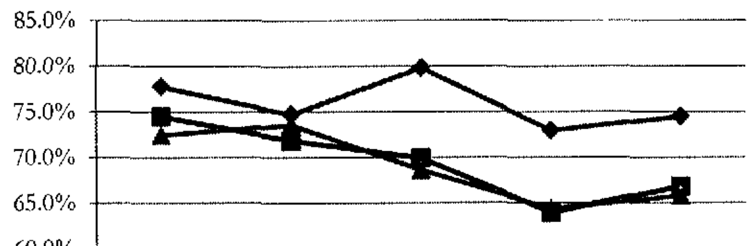
Equivalent Availability Factor



	2006	2007	2008	2009	2010
1000 + MW	82.23%	78.06%	84.76%	80.97%	80.04%
400-599 MW	84.13%	80.66%	82.72%	80.88%	81.33%
300-399 MW	86.20%	83.88%	83.59%	84.44%	83.76%

1000 + MW   400-599 MW   300-399 MW

Net Capacity Factor



	2006	2007	2008	2009	2010
1000+ MW	77.76%	74.71%	79.78%	72.95%	74.48%
400-599 MW	74.51%	71.81%	69.92%	63.99%	66.79%
300-399 MW	72.41%	73.58%	68.61%	64.35%	65.79%

1000+ MW   400-599 MW   300-399 MW

Source: North American Electric Reliability Corporation – Generating Availability Data System July 2011 Garrpt 1 and Garrpt 2 reports

Finding IV-9 **There were no significant changes in Duke Energy Ohio's unit annual heat rates between 2010 and 2011.**

Schumaker & Company performed a 2006-2011 analysis of the annual heat rates of the units Duke Energy Ohio operates. *Exhibit IV-23* shows the annual heat rates for each of the units. Beckjord 2 and 3 had to be run for a short period of time during 2011 to retain the operating license for the units. Beckjord 4 experienced a number of periods of wet coal causing a higher heat rate. The heat rates for Beckjord 5 and 6, Miami Fort 7 and 8, and Zimmer did not experience major changes between 2010 and 2011.

Exhibit IV-23
Unit Heat Rates
2006 to 2011

[redacted]

Source: Information Response 147 and 289

C. Recommendations

None.

V. Fuel Handling & Inventory Management

A. Background

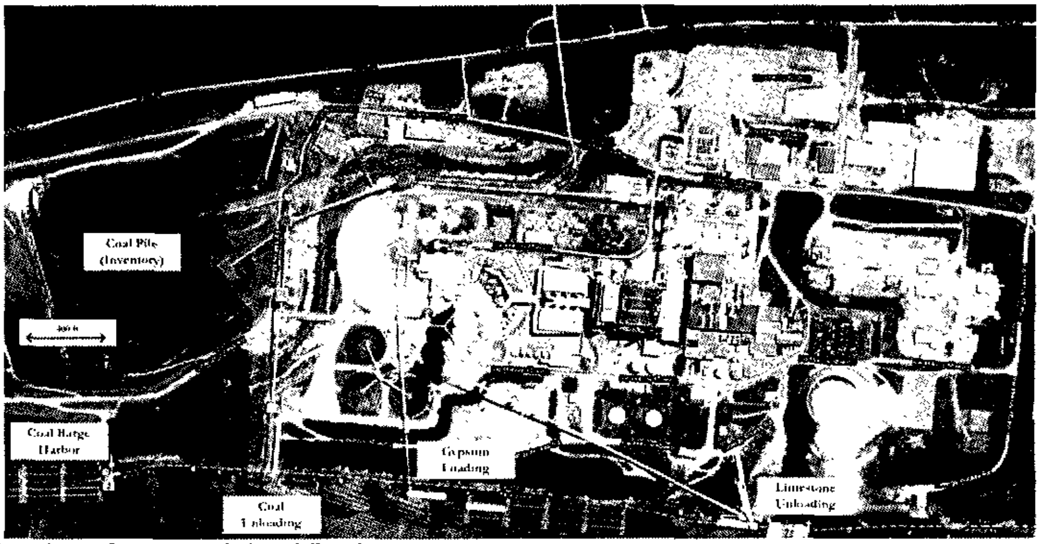
As stated in the Fuel Forecasting & Procurement chapter, responsibilities for Duke Energy Ohio's fuel management processes were realigned during 2010 into three categories:

- Fuel Forecasting & Procurement
- Fuel Handling & Inventory Management
- Plant Operation & Maintenance

This chapter analyzes the Fuel Handling & Inventory Management processes.

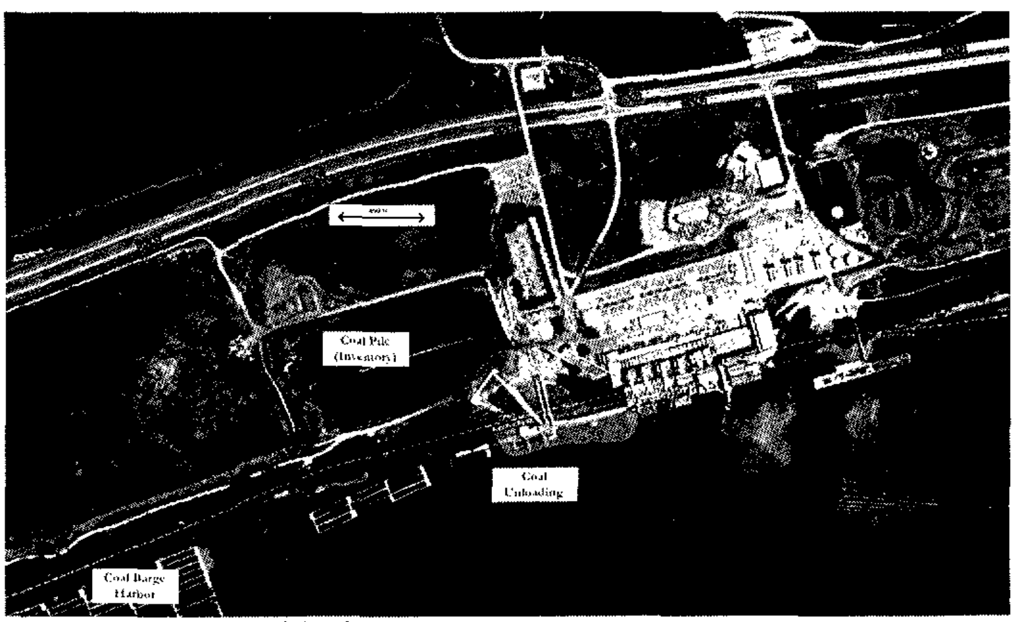
Fuel handling and inventory management systems are associated with the coal, fuel oil, natural gas, and limestone used by the Duke Energy Ohio plants to generate energy. Natural gas used at the Dick's Creek station is delivered by the local gas distribution company (LDC) as it is burned for generation. Fuel oil is delivered by barge predominately, backed up by truck, to tanks at each location as needed or economically available. Coal and limestone is delivered by barge to Miami Fort, Beckjord (coal only), and Zimmer. A separate handling system is required for each of the two commodities of coal and limestone. Components of each of the handling systems include a barge harbor, an unloading facility, and a conveyor system. *Exhibit V-1*, *Exhibit V-2*, and *Exhibit V-3* show the material handling systems at Zimmer, Beckjord, and Miami Fort Stations respectively. The coal handling systems are highlighted on each exhibit.

Exhibit V-1
Zimmer Fuel Handling & Inventory Management Systems
as of December 31, 2011



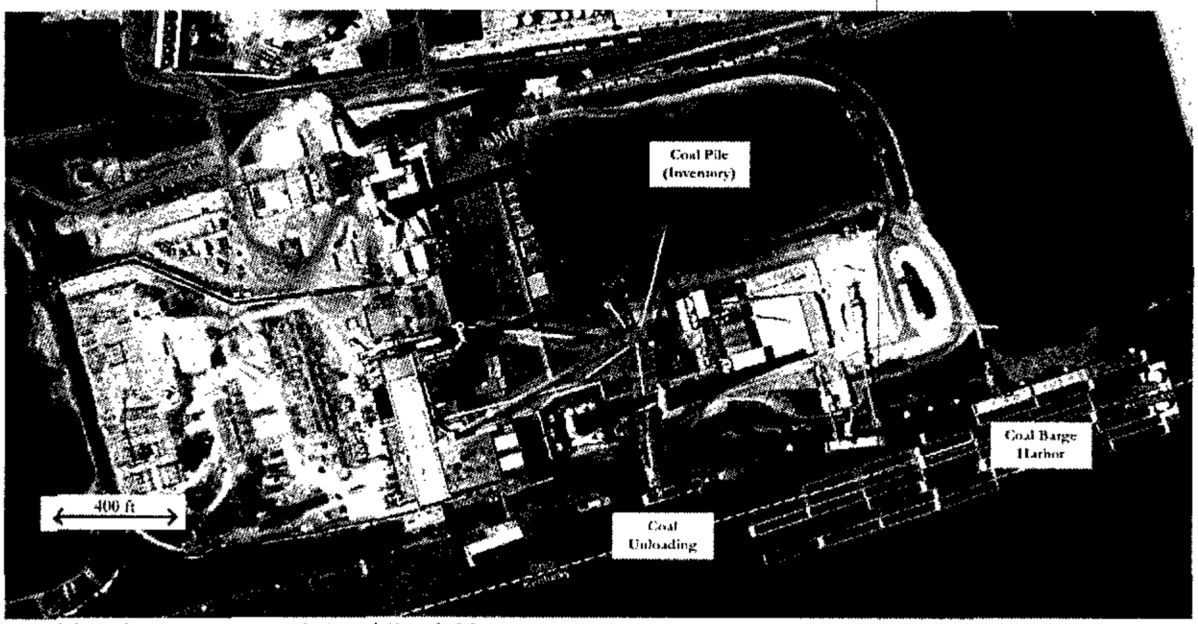
Source: Schumaker & Company analysis and Google Maps

Exhibit V-2
Beckjord Fuel Handling & Inventory Management Systems
as of December 31, 2011



Source: Schumaker & Company analysis and Google Maps

Exhibit V-3
Miami Fort Fuel Handling & Inventory Management Systems
as of December 31, 2011



Source: Schumaker & Company analysis and Google Maps

B. Findings and Conclusions

Finding V-1 **The Coal Logistics and Materials Handling organization, created in 2010, continues to be focused on fuel handling and inventory management at all the generating plants.**

Interviews were conducted by Schumaker & Company consultants to verify Duke Energy Ohio's fuel handling and inventory management organizational charts. The Coal Logistics and Materials Handling organization appears to be appropriate and has focused responsibly for fuel handling and inventory management at all the generating plants. The organization is shown in *Exhibit V-4*.

Exhibit V-4
Duke Energy Ohio Coal Logistics and Material Handling Organization
as of December 31, 2011

[redacted]

Source: Information Response 272

The Coal Logistics and Materials Handling (CLMH) organization, with 45 employees (down from 48 in 2010), including the director, is responsible for the delivery, including maintenance of equipment, of coal and limestone from the time the commodity is loaded on barges by the vendor until it is delivered to the coal-burn bunkers or limestone-staging facilities. Specific roles within the organization are:

- Station Logistics and Material Handling is responsible for managing the barge harbor, for unloading coal and limestone barges, for managing coal inventory piles, for managing demurrage charges, and for the operation and maintenance of the material handling equipment at the plants. 2011 staffing at the plants was:

- One (1) coordinator, reporting to the director, supervising eight (8) full-time equivalent (FTEs) material handling employees at Miami Fort
- One (1) coordinator, reporting to the director, supervising nine (9) material handling FTEs at Beckjord
- One (1) coordinator, reporting to the director, supervising sixteen (16) material handling FTEs at Zimmer

♦ Maintenance Support for the maintenance of the station material handling equipment is staffed with one (1) manager, reporting to the director, and four (4) FTE.

♦ Logistical Support, each with direct report to the director, is provided by one (1) coal scheduler; one (1) field representative; and one (1) coordinator.

Finding V-2 **Duke Energy Ohio's coal transportation costs were 21.3% higher in 2011 than 2010.**

Duke Energy Ohio's contract with Ingram Barge Company for barge transportation services ended December 31, 2010. During 2010, Duke Energy Ohio negotiated contracts covering 2011–2012 with adjustment riders for diesel fuel expense.

Schumaker & Company requested and analyzed coal transportation cost for 2008 through 2011. *Exhibit V-5* presents the results of this analysis.

Exhibit V-5
Coal Transportation Costs
2008 to 2011

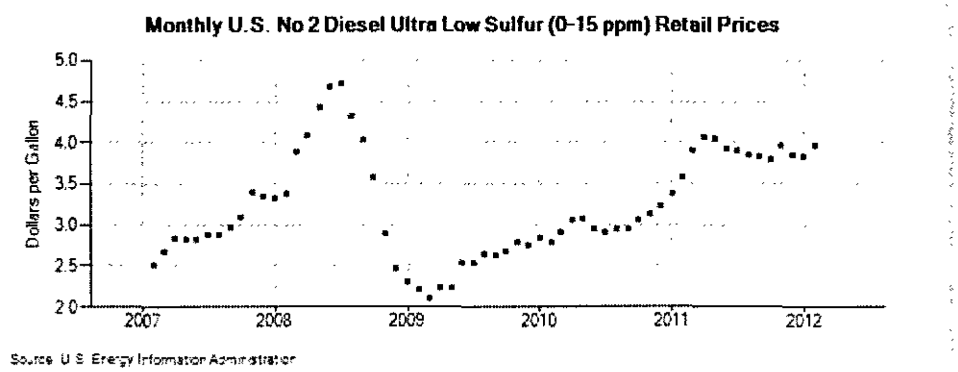
[redacted]

Source: Information Response 140 and 282

Coal transportation cost per ton during 2011 was 21.3% [redacted] higher than 2010, 31.8% higher [redacted] than 2009, and 4.3% [redacted] than 2008. It was anticipated that coal transportation cost may increase for 2011 because the barge contracts provide for a pass through of the barge company's fuel costs.

The transportation cost of commodities transported by barge on rivers is very dependent on the price of diesel fuel used to power the boats used to push barges. *Exhibit V-6* gives historical national average monthly price of diesel fuel for the last five (5) years. As can be seen, variations from year to year are similar between *Exhibit V-5* and *Exhibit V-6*.

Exhibit V-6
Monthly Retail Diesel Fuel Prices
February 2007 to February 2012



U.S. No 2 Diesel Ultra Low Sulfur (0-15 ppm) Retail Prices (Dollars per Gallon)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2007		2.513	2.680	2.847	2.818	2.826	2.881	2.881	2.961	3.087	3.409	3.356
2008	3.322	3.386	3.889	4.094	4.434	4.687	4.712	4.315	4.036	3.589	2.889	2.457
2009	2.302	2.205	2.097	2.225	2.233	2.532	2.544	2.638	2.630	2.676	2.797	2.749
2010	2.849	2.789	2.918	3.063	3.073	2.950	2.912	2.959	2.946	3.052	3.140	3.243
2011	3.388	3.584	3.905	4.064	4.047	3.933	3.905	3.860	3.837	3.798	3.962	3.861
2012	3.833	3.953										

- = No Data Reported; -- = Not Applicable; NA = Not Available; W = Withheld to avoid disclosure of individual company data.

Release Date: 3/19/2012
Next Release Date: 3/26/2012

Source: http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=emd_epd2dxl0_pte_nus_dpg&f=m

From *Exhibit V-6*, the average annual price (dollars per gallon) of diesel fuel was $3.845 for 2011, $2.991 for 2010, $2.469 for 2009, and $3.818 for 2008. The average diesel price in 2011 was 28.6% higher than 2010, 55.7% higher than 2009, and 0.7% higher than 2008.

Finding V-3 **Duke Energy Ohio's Coal Logistics and Material Handling organization reduced demurrage[6] charges 53.2% in 2011 from 2010 levels.**

The focus of the Coal Logistics and Material Handling organization, formed during the last half of 2010, is to manage the coal inventory according to the Midwest Commercial Generation (MCG) Inventory Policy. The formation of the CLMH group highlighted demurrage as an active area to manage costs versus risks. Duke Energy Ohio incurred [redacted] in demurrage charges during 2011, [redacted] in 2010, and [redacted] in 2009. The 2011 charges are 53.2% less than the 2010 level and 34.5% less than 2009 total. *Exhibit V-7* shows the annual levels and the significant variability between monthly charges.

Exhibit V-7
Demurrage Charges
2009 to 2011

[redacted]

[redacted]

Source: Information Responses 86, 200, and 301

[6] / Demurrage is a charge incurred from the barge line if the barges are not offloaded in a timely fashion and returned to the barge line for use. Demurrage is usually assessed on a per-barge per-day basis beyond a certain grace period.

CLMH uses a number of reports to manage and control barge traffic in order to minimize demurrage charges.

Exhibit V-8 provides an example of the report that is used to monitor locations of coal barges supplying Duke Energy Ohio's generating stations. *Exhibit V-9*, *Exhibit V-10*, and *Exhibit V-11* shows reports used to monitor the number of barges in the harbors at Beckjord, Zimmer, and Miami Fort.

Exhibit V-8
Metric Used to Monitor Coal Barges Loaded/En Route
as of December 31, 2011

Coal Barges Loaded/En Route

BECKJORD

	Current Location	Origin	# Barges	ETA	Barge Line
12/13	Bellaire Harbor	1 Marietta, 4 McElroy	5	12/16 PM	Ingram
	KRT Marmet	KRT Marmet - LS coal	1	12/16 PM	Ingram
	Superior Fleet	Shrewsbury	1	12/17 AM	Ingram
	Lee Synnott	Highland/Uniontown	15	12/17 PM	Ingram
	Shawneetown	Arclar	3	12/18 AM	Ingram

ZIMMER

	Current Location	Origin	# Barges	ETA	Barge Line
12/13	Barbara	2 McElroy, 7 ACS	9	12/13 PM	Crounse
	Debi Sharp	ACS	15	12/14 PM	Crounse
	Jincy	ACS	1	12/14 PM	Crounse
	Laura Tamble	2 Somerville, 6 WB	8	12/15 AM	Crounse
	Big Bend	Big Bend - CBS&C	1	12/16 PM	Crounse
	Sara Page	2 Somerville, 5 WB	7	12/17 AM	Crounse
	Mt. Vernon	Elk Creek	6	12/17 PM	Crounse
	ACS	ACS	15	12/17 PM	Crounse
	Sandy Drake	Oxford	1	12/17 PM	Crounse

MIAMI FORT 7 & 8

	Current Location	Origin	# Barges	ETA	Barge Line
12/13	Robert C. Loedding	Shoemaker	1	12/13 PM	Ingram
	Laura Tamble	WB	7	12/14 PM	Ingram
	William E. Porter	ACS	15	12/15 PM	Ingram
	Harry R. Jacobson	Elk Creek	4	12/15 PM	Ingram
	Bellaire Harbor	Shoemaker	1	12/16 PM	Ingram
	Sara Page	Somerville	3	12/16 PM	Ingram
	Ytown	WB	1	12/16 PM	Ingram
	Mt. Vernon Fleet	Elk Creek	3	12/17 AM	Ingram

Source: Information Response 299

Exhibit V-9
Metric Used to Monitor Barge Count at the Beckjord Harbor
September - December, 2011

[redacted]

Source: Information Response 299

Exhibit V-10
Metric Used to Monitor Barge Count at the Zimmer Harbor
September - December, 2011

[redacted]

Source: Information Response 299

Exhibit V-11
Metric Used to Monitor Barge Count at the Miami Fort Harbor
September - December, 2011

[redacted]

Source: Information Response 299

Finding V-4 The Fuel Handling and Inventory Management organization implemented comprehensive coal pile management processes during 2011.

Generally, coal is off loaded from barges and transported via conveyor directly to the burn bunkers. Coal is added to inventory piles if units are down and barges cannot be diverted or inventory is built up in anticipation of river transportation problems (high water, ice, etc.). Coal is used from the piles when unloading equipment undergoes maintenance or other conditions, such as barge delays, occur.

CLMH implement a three (3) week coal pile planning process during 2011. *Exhibit V-12* provides a copy of the three (3) week plan ending December 31, 2011.

Exhibit V-12
Three (3) Week Coal Pile Inventory Plans
as of December 31, 2011

[redacted]

Source: Information Response 299

CLMH implemented daily tracking by quarter of actual coal pile inventories compared to target for each of the generating stations. *Exhibit V-13* shows the tracking report for the last quarter of 2011.

Exhibit V-13
Coal Pile Inventories
September -December, 2011

[redacted]

Source: Information Response 299

In addition, CLMH created reports of daily coal pile activity with notations of events affecting the size of the pile. *Exhibit V-14*, *Exhibit V-15*, and *Exhibit V-16* provide the 4th quarter 2011 reports for Miami Fort, Beckjord, and Zimmer stations respectively.

Exhibit V-14
Metric Used to Monitor Miami Fort 7 & 8 Station Coal Pile Activity
September - December, 2011

[redacted]

Source: Information Response 299

Exhibit V-15
Metric Used to Monitor Beckjord Station Coal Pile Activity
September - December, 2011

[redacted]

Source: Information Response 299

Exhibit V-16
Metric Used to Monitor Zimmer Station Coal Pile Activity
September - December, 2011

[redacted]

Source: Information Response 299

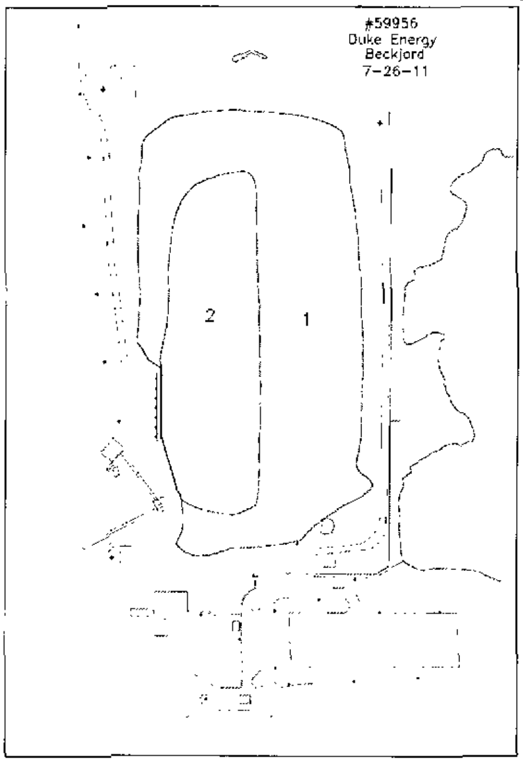
Finding V-5 **Duke Energy Ohio's total book inventory of coal was increased 2.18% (18,216 tons) in December 2011 as a result of an aerial physical coal inventory of Beckjord, Miami Fort, and Zimmer station coal piles performed during 2011.**

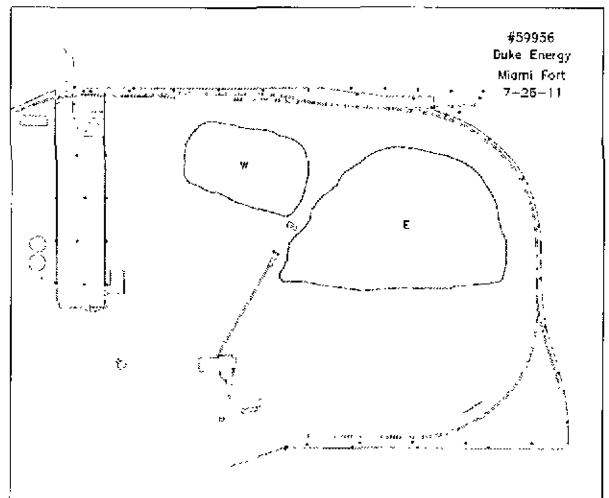
Schumaker & Company consultants requested and analyzed the documentation of any adjustments made to book inventory as a result of a physical coal inventory during 2011. Duke Energy Ohio has used the same aerial survey process for physical coal inventory checking for a number of years:

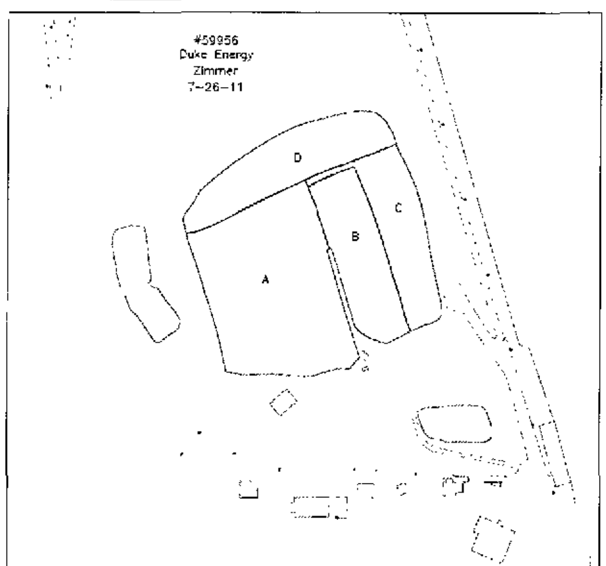
- Coal piles are dressed prior to fly over
- Coal piles are defined, with lime if required, the day before flyover
- Core samples from piles are taken for density at time of flyover (have not seen wide variation in density from year-to-year)
- Aerial Survey vendor calculates volumes on piles and supplies a report for each pile that includes pictures showing coal pile outline and elevations of the piles
- Adjustments, regardless of size, are booked in December of the survey year

Exhibit V-17 shows the outlines of the coal piles at Beckjord, Miami Fort, and Zimmer that were defined for the aerial survey.

Exhibit V-17
Beckjord, Miami Fort, and Zimmer Coal Pile Outlines
July 26, 2011



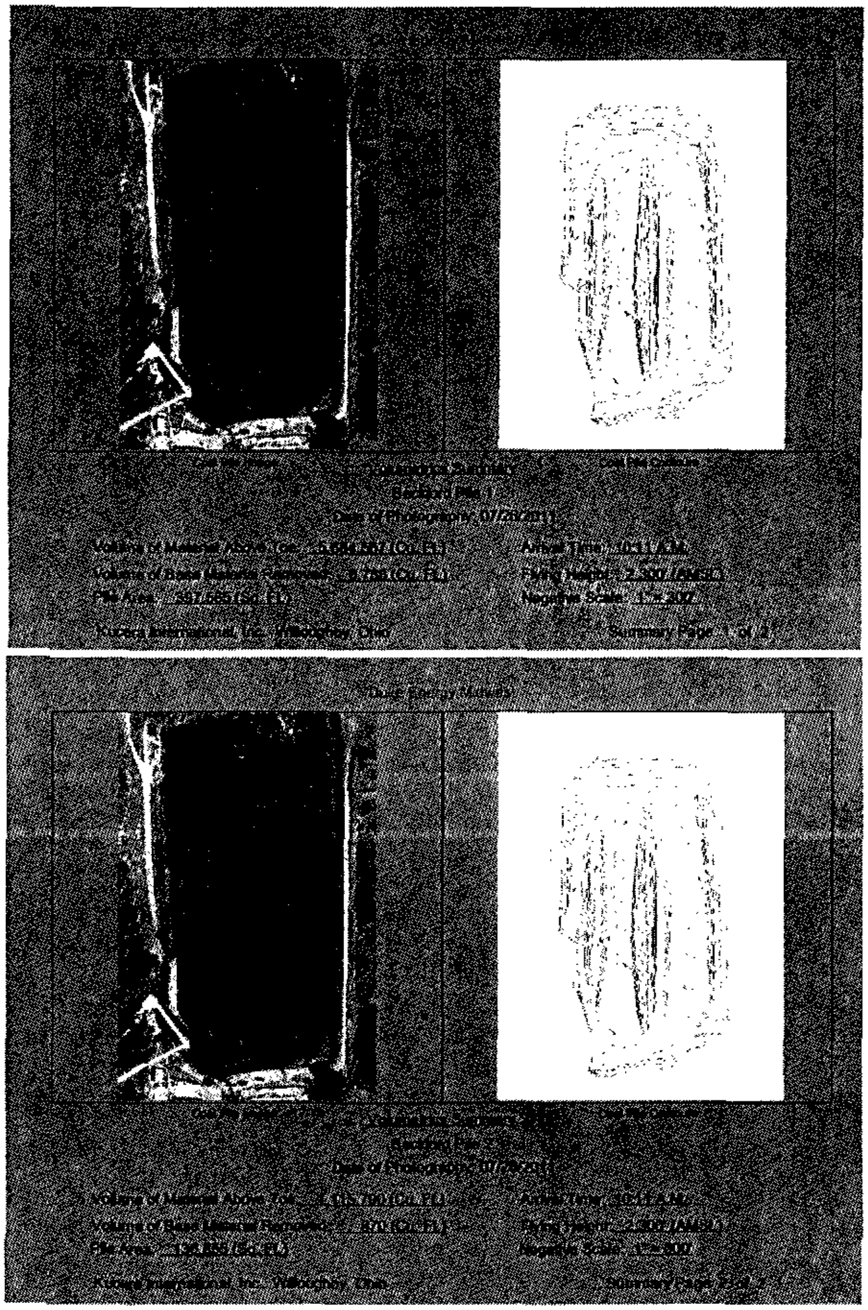




Source: Information Responses 287 (b, c, and d)

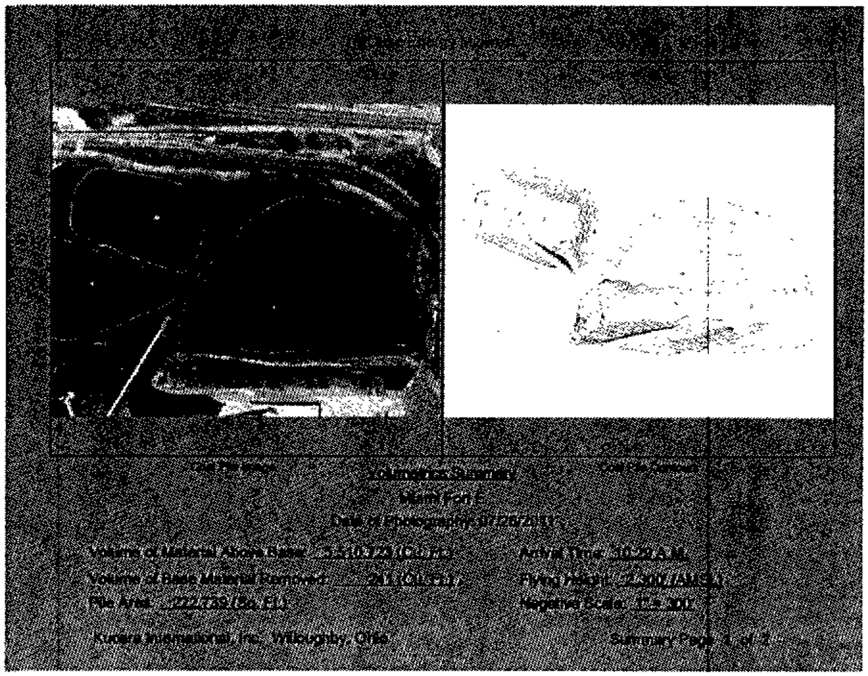
Exhibit V-18, *Exhibit V-19*, *Exhibit V-20*, and *Exhibit V-21* give the aerial images and contours for the defined piles for Beckjord, Miami Fort, and Zimmer.

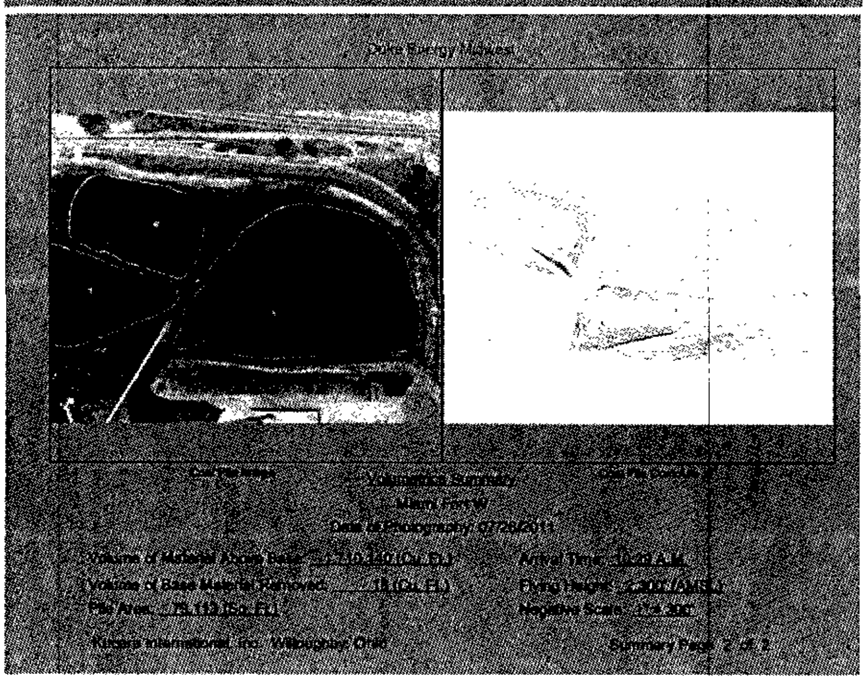
Exhibit V-18
Beckjord Aerial Coal Pile Images and Contours
July 26, 2011



Source: Information Response 287(b)

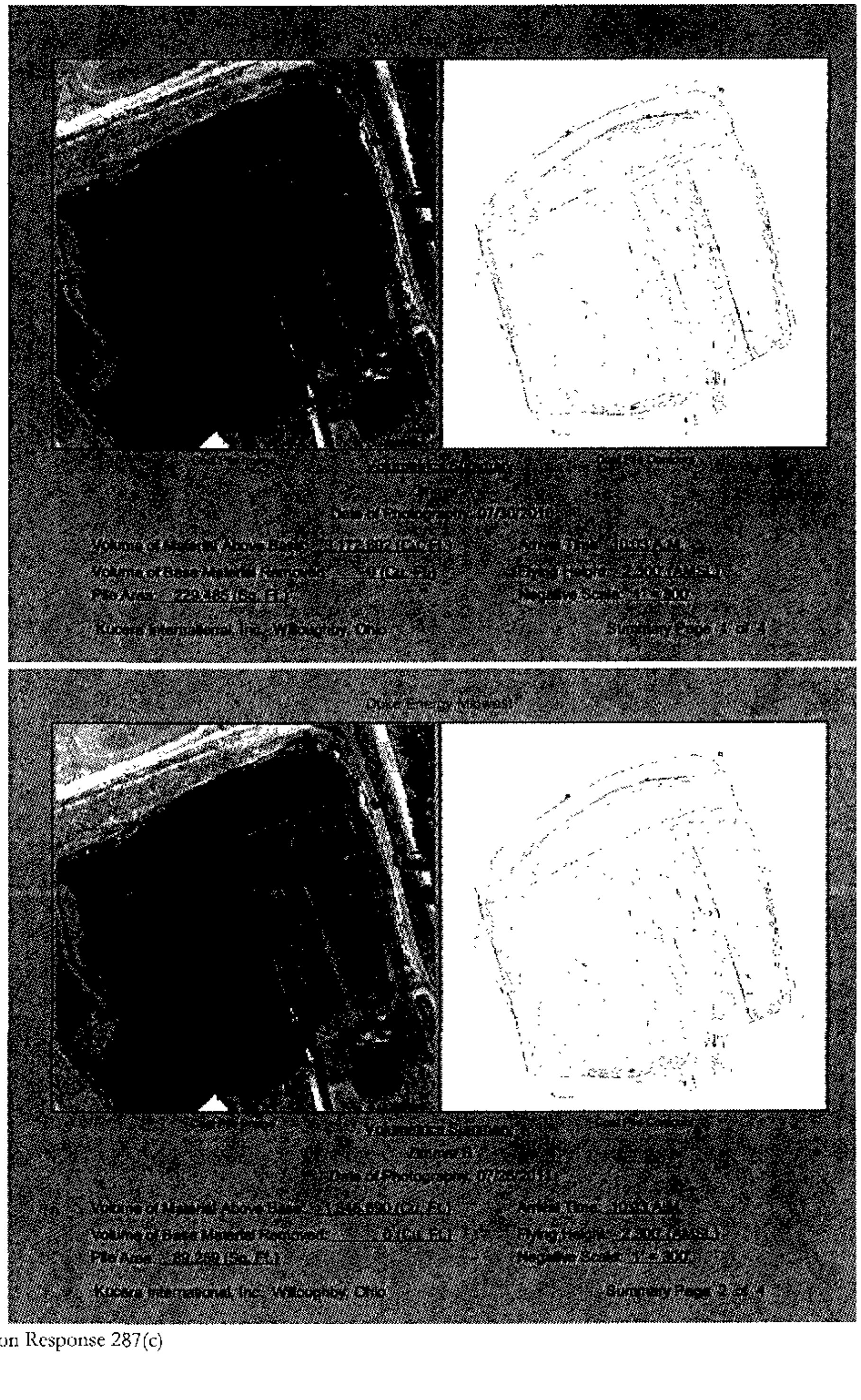
Exhibit V-19
Miami Fort Aerial Coal Pile Images and Contours
July 26, 2011





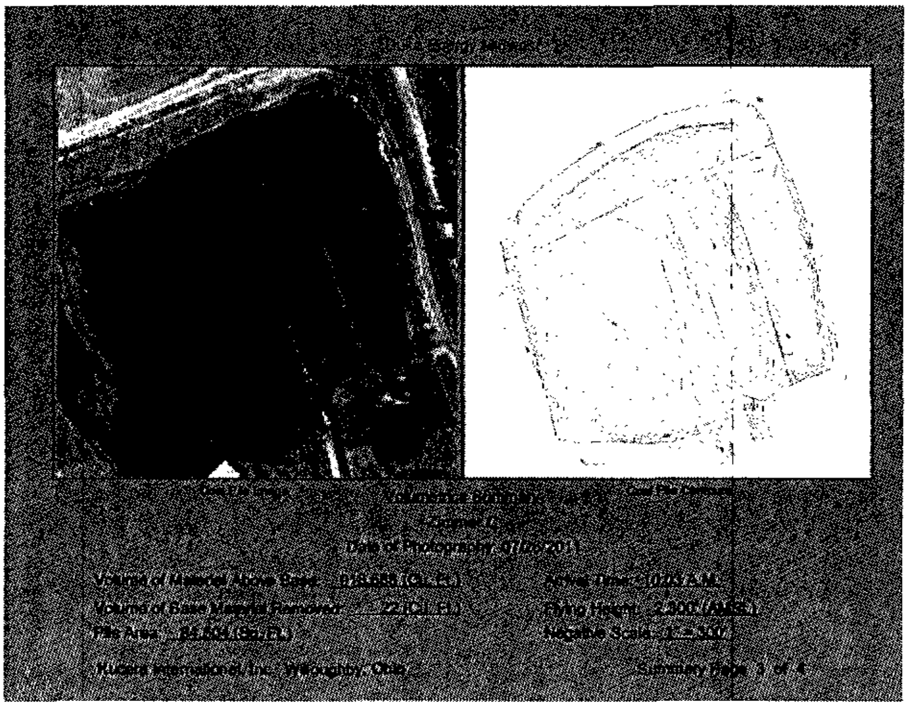
Source: Information Response 287(d)

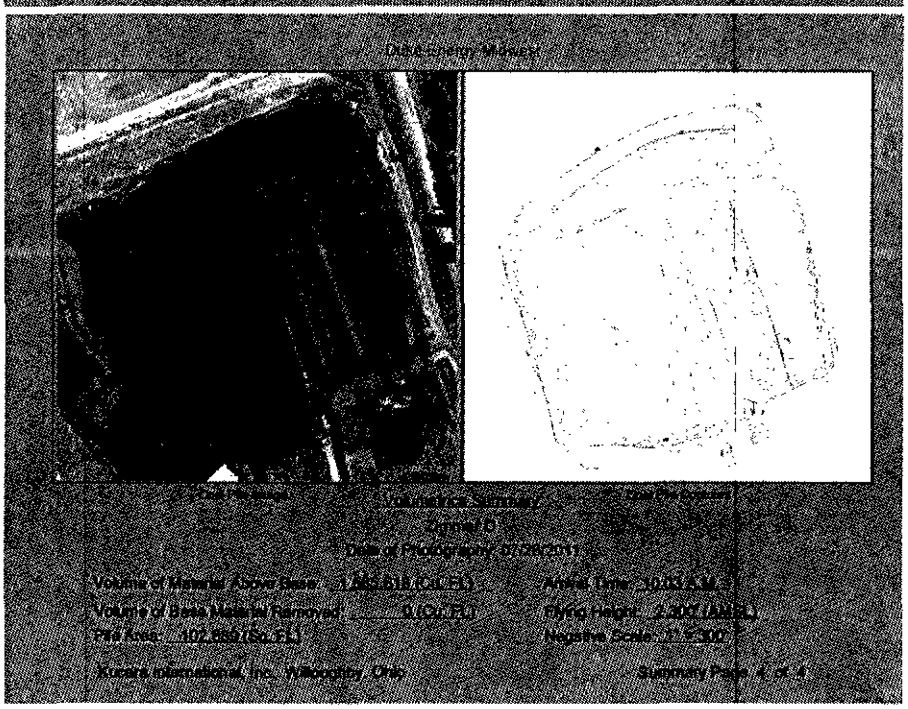
Exhibit V-20
Zimmer Aerial Coal Pile Images and Contours
July 26, 2011



Source: Information Response 287(c)

Exhibit V-21
Zimmer Aerial Coal Pile Images and Contours
July 26, 2011





Source: Information Response 287(c)

The results of the physical inventory survey are booked in December of the year of the aerial survey. *Exhibit V-22* shows the summary of the comparison between the aerial survey results and the book value.

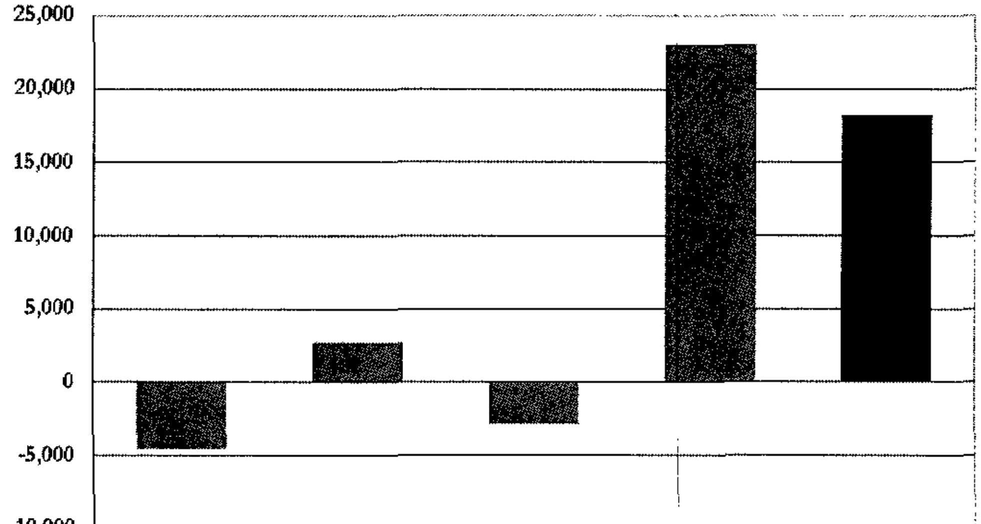
Exhibit V-22
Year-end Aerial Survey Summary of Coal Inventory
December 31, 2011

[redacted]

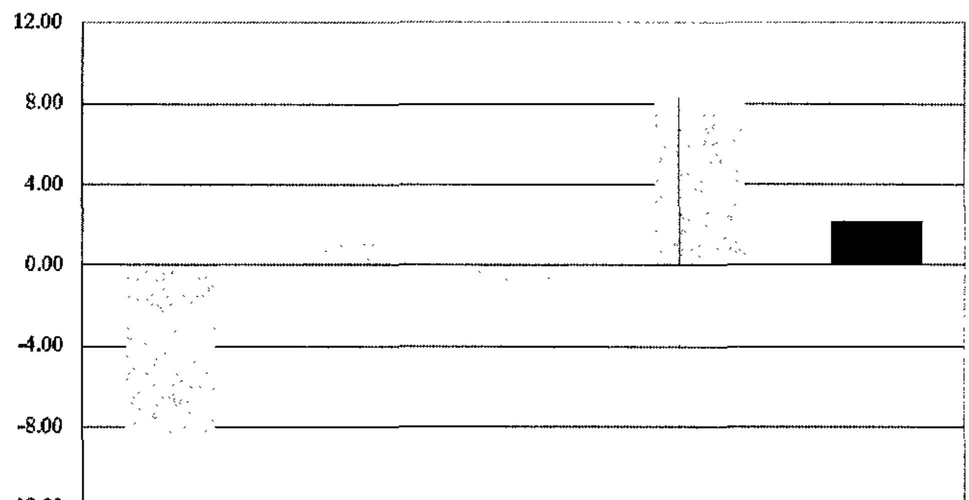
Source: Information Responses 287 (b, c, and d)

The book adjustments (tons and percent) to station coal inventories that were applied in December 2011 are shown in *Exhibit V-23*. The Beckjord high sulfur (HS) book inventory was reduced by 4,590 tons (8.37%) while the LS (low sulfur) inventory was increased by 2,701 tons (1.19%). The Miami Fort book inventory was decreased 2,907 tons (1.04%) and the Zimmer book was increased 23,012 tons (8.27%). Duke Energy Ohio's total book inventory was increased by 18,216 tons (2.18%).

Exhibit V-23
Coal Inventory Book Adjustments Resulting from Physical Inventory
December 31, 2011



	Beckjord HS	Beckjord LS	Miami Fort	Zimmer	TOTAL
Tons Adj to Book Value	-4,590	2,701	-2,907	23,012	18,216



	Beckjord HS	Beckjord LS	Miami Fort	Zimmer	TOTAL
% Adj to Book Value	-8.37	1.19	-1.04	8.27	2.18

Source: Information Response 287 (b, c, and d)

Finding V-6 **Duke Energy Ohio continues to follow written procedures to calibrate the coal conveyor-belt scales at the generating stations it operates.**

Schumaker & Company consultants confirmed in visits to Miami Fort and Zimmer plants that scale calibration procedures received and reviewed for the 2010 audit continued to be used during 2011. During the 2010 audit, Duke Energy Ohio indicated that they use "Handbook 44" as a guideline but that none of the scales at the plants are used for payments.

Documentation of monthly belt scale calibrations were requested and reviewed. *Exhibit V-24* provides the vendors "Belt Scale Calibration Report" from a July 19, 2011 static weight test and calibration.

Exhibit V-24
Vendor's Monthly Belt Scale Calibration Report with Static Weight Test for Miami Fort
July 19, 2011

BELT SCALE CALIBRATION REPORT		*Duke Energy Ohio*	
by: Wheatley Scale Service, Inc.		*Miami-Fort Station*	
DATE:	July 19, 2011		
BELT ID:	A Conveyor		
SCALE DESIGN:	Ramsey 10-14-4-42 w/2301		
INSTALLED:			
Master Totalizer			
Final Reading	9794210.3	As Found Zero	34298
Start Reading	9794209.6	As Found Span	302701
As Found Zero Error	-0.21%	As Left Zero	34117
As Found Span Error	0.04%	As Left Span	302701
As Found Total Error	-0.17%		

TEST RESULTS::

Test Type	Test Results	Calibration Constant	Weight Difference	Percent Error	Adjustment Made
As Found Zero	-0.560			-0.21%	No
Zero After Inspection	-1.580			-0.60%	Yes
Zero Recheck	-0.010			0.00%	No
Zero Recheck	-0.020			-0.01%	No
Static Wt. Test	198.240	198.153	0.087	0.04%	No
Static Wt. Test	198.240	198.153	0.087	0.04%	No
As Left Static Wt	198.230	198.153	0.077	0.04%	No
Final Zero	-0.090			-0.20%	No

Remarks: Inspected scale and adjacent areas. Scale was dirty as found. Cleaned all material from scale and pinch points. Also cleaned material off of the idlers in the weigh area. It builds up till it touches the cans and keeps them from turning. Belt tracking and idlers look good. Ran zero and static weight calibration tests. Made zero adjustment only.

Test Conditions: Cloudy and humid, 95 degrees

Scale Data:	Scale Capacity	1500.0	TPH
St Wt Cal Con. 198.153	Belt Width	42	Inches
Cal Factor: -0.28%	Belt Length	972.16	Feet
Idler Spacing: 48"	Belt Rev. Time	78.4	Seconds
ZDB: 0.1%	Belt Speed	744	FPM
AZT: Yes	Test Time	627	Seconds
Wt on LC: 8.9	Test Length	7777.28	Feet
S P/M 11600	Incline angle	15.6	Degrees
	Static Wt.	817.6	Pounds
Prescale: 1	Test Duration #	121422	Counts
	Load Cell Capacity (4)	1000	Pounds

Belt Scale Tech: Jason F. Wheatley
Wheatley Scale Service, Inc.
Phone # (812) 359-5104
Fax # (812) 359-5844

Source: Information Response 286(b)

Finding V-7 **No maintenance or housekeeping anomalies were observed during a tour of Miami Fort and Zimmer stations.**

Schumaker & Company consultants conducted interviews at and toured Miami Fort and Zimmer generating stations on March 8, 2012. Coal piles at each of the stations were viewed from the upper floors of the plants. No anomalies were observed during the tours.

C. Recommendations

None

VI. Environmental Compliance

A. Background

Generally, a governmental regulatory authority (federal and/or state and/or local) sets limits (caps) on the amount of various pollutants that can be emitted by a generating unit. Emission permits, along with the equivalent number of allowances (credits), which represent an authorization to emit a specific amount of a particular pollutant, are issued to generating unit owners or other groups. Total emissions are limited to the caps and are equal to the total amount of allowances and credits. If a company needs to increase its emission allowance, credits must be bought from sources that pollute less. In theory, pollution will be reduced at the lowest cost to society because entities will make changes to cheaply reduce their pollution so they can sell their allowances.

One administrative approach used to control pollution provides economic incentives for achieving reductions in the emissions of pollutants. It is known as emissions trading (cap and trade). Duke Energy Ohio's emissions trading process is discussed in *Chapter III – Fuel Forecasting & Procurement.*

Electric generating stations were originally designed to meet the environmental regulations that were in effect at the time of construction. Modified regulations come into existence as the state of environmental science improves. Compliance with the new regulations requires either additional emissions trading or changes to the physical equipment and/or operations of the plant. Significant physical modifications may cause a reset of the emission caps and affect the allowance credits.

B. Findings and Conclusions

Finding VI-1 **Duke Energy Ohio's generating units have defined emission allowance targets.**

Schumaker & Company requested and reviewed documentation of the environmental contracts for each of Duke Energy Ohio's generating units. The environmental constraints for Beckjord, Miami Fort, and Zimmer are given in *Exhibit VI-1*, *Exhibit VI-2*, and *Exhibit VI-3* respectively.

Exhibit VI-1
Beckjord Environmental Constraints
as of December 31, 2011

[redacted]

Source: Information Responses 28 and 149

Exhibit VI-2
Miami Fort Environmental Constraints
as of December 31, 2011

[redacted]

Source: Information Responses 28 and 149

Exhibit VI-3
Zimmer Environmental Constraints
as of December 31, 2011

[redacted]

Source: Information Responses 28 and 149

Finding VI-2 **Duke Energy Ohio continues to manage its emission allowances positions based on the expected burn at each of its plants.**

During a tour of the Portfolio Risk Management trading floor on March 9, 2011, the emission allowances trader in the Portfolio Risk Management group provided Schumaker & Company consultants with an explanation of the process used to manage emission allowances positions. Positions are managed based on forecasts from the Commercial Business Model (CBM) and on knowledge of current conditions. Duke Energy Ohio has been offering emission allowances to the market but the recent stability of the market has resulted in few counterparties.

Finding VI-3 **Duke Energy Ohio did not receive any citations for environmental violations during 2011 and all earlier citations have been settled and no further activities are ongoing on the earlier citations.**

Schumaker & Company requested and reviewed documentation of any citations or notices of violation (NOVs), including fines for environmental violations Duke Energy Ohio received during 2010. There were no additional citations in 2011. Fines paid for environmental citations are not included in the Fuel and Purchased Power (FPP).

Finding VI-4 **Duke Energy Ohio continues to monitor potential regulations that could have an impact on future operations of the coal-fired plants.**

With the except of Beckjord, all of Duke Energy Ohio generating stations have under gone upgrades to the latest environmental controls in the last 10 years. The Beckjord generating stations contains some of the older, smaller generating units which have not been upgraded and in fact three of the units have been recently mothballed. At this time, the Beckjord units are currently scheduled to be retired instead of upgraded pending the final resolution of environmental regulations that are underway. Regulations for coal-burning plants continue to be a focus within the United States. The recent nuclear plant situation in Japan that resulted from an earthquake and subsequent tsunami, along with a continuing strengthening of the economy, will sharpen the discussion about sources of electric generation in the United States. Duke Energy Ohio and other utilities in the nation will ultimately be impacted.

C. Recommendations

None

VII. Alternative Energy Portfolio

This chapter discusses Duke Energy Ohio's activities in response to Administrative Code Chapter 4901:1-40.

A. Background

Chapter 4901:1-40 of the Ohio Administrative Code (resulting from Ohio Senate House Bill 221) requires all electric utilities and electric services companies to develop an alternative energy resource portfolio, consisting of renewable and solar energy resources, according to annual benchmarks described in the Code. The alternative portfolio standard consists of both renewable energy resources and advanced energy resources. Because the renewable benchmarks began in 2009, with the larger alternative energy not beginning until 2024, the renewable (including solar) component has the more immediate focus. These requirements gradually increase from 2009 through 2024 to result in a renewable requirement by 2025 of 12.5% of which at least half must come from in-state sources. Included within the renewable requirement is a specific solar requirement of 0.5% by 2025 of which at least half must come from in-state sources.

An electric utility can meet these requirements by owning and operating the appropriate alternative energy facilities and/or purchasing the appropriate Renewable Energy Certificates (RECs). RECs, also known as Green Tags, Renewable Energy Credits, Renewable Electricity Certificates, or Tradable Renewable Certificates (TRCs), are tradable, non-tangible energy commodities in the United States that represent proof that one megawatt-hour (MWh) of electricity was generated from an eligible renewable energy resource. These certificates can be sold and traded or bartered. It is important to note that the energy associated with a REC may be sold separately and used by another party; therefore, the consumer of a REC may receive only a certificate.

In states that have a REC program, a green energy provider (such as a wind farm) is generally credited with one REC for every 1,000 kWh or one MWh of electricity it produces (For reference, an average residential customer consumes about 800 kWh in a month). The accompanying REC can then be sold on the open market.

An attribute tracking system gives each REC a unique identification number to make sure it doesn't get double-counted. They are then made available to MISO members in the Midwest Renewable Energy Tracking System (MRETS) and to PJM members in the Generation Attributes Tracking System (GATS). A report is issued by the Risk Management Trading Group that gives Duke Energy Ohio's position in meeting the Renewable Energy Credits Requirements.

B. Findings and Conclusions

Finding VII-1 Duke Energy Ohio asserts that it met its renewable requirements in 2011 by purchasing RECs.

The Renewable Strategy & Compliance group develops and oversees renewable strategies across all of Duke Energy's utility service territories, including Duke Energy Ohio. Renewable Strategy & Compliance establishes the contracting strategy for meeting the Duke Energy Ohio renewable requirements, including establishing the length of contracts to be pursued for compliance. During 2011, DEO asserts that it meet its renewable compliance obligations by procuring a significant quantity of RECs early in 2011. They pursued sufficient RECs in the event that if some of the suppliers were unable to delivery, they could still fulfill their obligations for the year. All of the suppliers performed and Duke Energy Ohio found themselves with a greater number of RECs than was needed for the year. As a result, Duke Energy was able to sell some of their earlier procured RECs back into the market near the end of the year at prices that were higher than their initial purchase prices effectively lowering Duke Energy Ohio's actual cost of compliance to Duke Energy Ohio ratepayers in that gains were credited via the FPP. Duke Energy Ohio's position (after these sales) regarding its renewable requirements as of December 31, 2011 is shown in *Exhibit VII-1*.

Exhibit VII-1
2011 REC Positions
as of December 12, 2011

[redacted]

Notes: Brought Forward – RECs are bankable and any length after compliance can be used in subsequent years, therefore any length in the position after filling the 2011 Requirements will be carried forward to use toward the 2012 Requirements

Source: Information Response 296

Finding VII-2 Going forward, the responsibility of compliance has been transferred from the Midwest Generation Group to the Duke organizations at Cincinnati, OH and Charlotte, NC.

During 2011, the responsibility of the compliance to Chapter 4901:1-40 of the Ohio Administrative Code (resulting from Ohio Senate House Bill 221) and procurement on RECs was within the Midwest Generation Group of Duke Energy. With the settlement in the recent ESP case, the responsibility for compliance and the procurement of RECs has been transferred to the Duke Renewable Strategy and Compliance Team located in Cincinnati, OH and the Regulated Portfolio Team located in Charlotte, NC. The positions shown previously in *Exhibit VII-1* have been transferred to this organization for management on a going forward basis.

Finding VII-3 Duke Energy Ohio continues to rely on purchased RECs has its primary method for achieving compliance.

Duke Energy Ohio has filed its current approach to addressing SB 221 in its latest Integrated Resource Plan which was submitted in July of 2011. It is important to recognize that subsequent to its filing, Duke Energy Ohio's latest ESP filing has been settled which will have an impact on subsequent IRP filings and Duke Energy Ohio's approach to Alternative Energy – especially with respect to the targeted numbers required.

Up until 2011, the compliance strategy of Duke Energy Ohio has consisted only of short term market REC purchases. The primary reason for this decision is that longer term contracts with third parties and utility-owned renewable resources both present cost recovery uncertainties that the Company presently feels would be imprudent to assume. These uncertainties exist because the Company's renewable obligation is based on SSO sales volume, which historically has been uncertain due to customer switching. Duke Energy Ohio recognizes that efforts other than short-term REC purchases may be needed in order to ensure compliance as renewable requirements increase over time; however, over the near term, it is assumed that the current cost recovery uncertainties will continue. While these cost recovery uncertainties exist, the Company has continued to rely primarily on short-term REC purchases but would consider other long-term procurement methods as additional options if the applicable cost recovery uncertainties were adequately addressed.

An exception to the aforementioned discussion is the Company's residential solar REC purchase program, which commits the Company to enter into long-term REC purchase agreements with residential customers. However, this program is not expected to contribute to the Company's total compliance requirements on a material basis due to the relatively small size of the applicable solar installations (residential homes).

Finding VII-4 **Duke has not developed any projections of the expected REC requirements for the next several years.**

Alternative energy targets are based on the last three year average of energy sales and the target percentages in Chapter 4901:1-40 of the Ohio Administrative Code. Although the target percentages increase each year but with the amount of customer switching that has taken place over the last two years, it is highly likely that the net effect is that the amount of RECs that may need to be acquired by Duke Energy Ohio may have decreased, in the short term. However, this information has not been present in any documentation reviewed to date.

C. Recommendations

Recommendation VII-1 **As part of this year's integrated resource plan, revise the plan for meeting the alternative energy requirements into the future based on the current ESP program. (Refer to Finding VII-1)**

The current Integrated Resource Plan provides an overall plan for meeting the Alternative energy requirements of Chapter 4901:1-40 of the Ohio Administrative Code. However, it needs to be updated for the current ESP going forward. It should also include a projection of the number of RECs required each year for the next several years. In that Duke Energy Ohio has experienced a significant amount of switching over the last three years, although the percentage requirements for each of the various renewable products is continuing to increase each year, Duke Energy Ohio's need to procure RECs may actually have remained level or decrease slightly.

VIII. Midwest ISO-Related Charges

This chapter discusses Midwest Independent System Operator (MISO) related charges.

A. Background

As a member of MISO, Duke Energy Ohio is obligated to sell the output from its generating units to MISO and to buy the electricity to serve its load from MISO at market rates. MISO's original responsibilities pertained to the regional planning and coordination of transmission facilities. However, since the beginning, MISO's role has evolved into the development of energy markets and an ancillary services market such that this evolution of the scope of MISO can be depicted as:

- Day 1 (starting in February 1, 2001) – Effective regional planning and transparent access to the transmission system.
- Day 2 (starting April 1, 2005) – Independent and transparent energy markets and improving operational efficiencies
- Day 3 (starting June 6, 2009) – Development of new products and services referred to as the Ancillary Service Market.

Duke Energy Ohio is currently in the process of moving from MISO to PJM Interconnection, LLC (PJM). Although that move was not completed during the audit period, several of the generating stations are have already been moved into the PJM market; specifically some of the joint owned units Conesville 4 and Killen The other joint owners of these units are already members of the PJM and therefore little change is involved. This early migration allowed Duke Energy Ohio to gain more experience by offering the units into the PJM market. Duke Energy Ohio completed its move to the PJM in early 2012, which was subsequent to our audit period.

B. Findings and Conclusions

Finding VIII-1 The processes and procedures for monitoring MISO charges are the same as our last review.

Duke Energy Ohio has developed a detailed process for monitoring MISO charges. MISO charges are handled through various settlement statements as shown in *Exhibit VIII-1*. There are five statements issued on a daily basis.

Exhibit VIII-1
MISO Settlement Process

S1	Internal statement created within Duke Energy Ohio – not from MISO
S7	Internal statement created within Duke Energy Ohio for comparison to 1st MISO statement
S14	MISO generated statement, first financially binding statement
S55	MISO generated statement that is financially binding
S105	MISO generated statement that is financially binding

Source: Information Response 44 and Interview 2,3,4,5

The S1, S7, S14, S55, and S105 statements represent activity from an operating day. For example, on February 2nd, Duke Energy Ohio personnel review the S1 for February 1st, on February 8th they review the S7 for February 1st, and on February 15th they review the S14 for February 1st, etc.

The S1 is not from MISO but is an internally generated calculation for the estimated value for the operating day. The S7 is the first MISO provided statement that can be compared to the S1. Duke Energy Ohio uses the S1 to compare to the MISO S7 to identify any disagreements which could result in a dispute. The MISO S14 is the first financially binding statement – i.e., MISO is paid based on this statement and generators are paid by MISO based on this statement. Duke Energy Ohio compares these values to the previously issued S7 to ensure agreement with all the values to identify any issues to dispute. Any remaining disputed amounts end up being settled on the S55 and S105. When the S55 is received from MISO, Duke Energy Ohio compares these values to the S14. The S55 are also financially binding and Duke Energy Ohio settles cash on an incremental basis. When the S105s are received, Duke Energy Ohio compares these values to the S55 to ensure agreement on the values to identify any issues that can be disputed. The S105s are also financially binding and settled on the incremental value.

Finding VIII-2 Duke Energy Ohio effectively uses its Financial Transmission Rights (FTR) to hedge against Day-Ahead congestion.

MISO is composed of both a Day-Ahead (DA) and Real-Time (RT) market for energy. Approximately 90% or more of the revenue is exchanged in the DA market. Generator offers and demand bids are due by 1100 EST the day before and the results are back by 1600 EST the day before. MISO operates based on a concept of Locational Marginal Pricing (LMP) which translates into the formula:

LMP = Energy + Congestion +Losses

There are LMPs for each generating station and LMPs for each load consuming location (such as an electric utility service area). Each generating stations has an LMP which is composed of the above three components. Energy is derived from the generating stations heat curve and congestion and losses are characteristics of the transmission system and expected load flows which MISO is responsible for determining for each location.

ARRs are defined as entitlements allocated annually to Firm Transmission Service Customers that entitle the holder to receive an allocation of the revenues from the Annual FTR Auction.[7] ARRs can be converted to cash or FTRs based on the annual auctions. A FTR is defined as a financial instrument that entitles the holder to receive compensation for certain congestion-related transmission charges that arise when the grid is congested and differences in locational prices result from the redispatch of generators out of merit order to relieve that congestion.[8] Depending on the RTO (Regional Transmission Organization), MISO and PJM for 2011, FTR auctions are held annually, quarterly, and monthly. Therefore the shortest time for which FTRs apply is monthly. There is no day-ahead market for FTRs.

FTR pricing is dependent on the source and delivery points of the energy. Both MISO and PJM provide FTR pricing data to the public from their web sites which we reviewed. We reviewed the method that was used to calculate congestions charges for any period.

The Duke Energy Ohio position regarding FTR is managed in a similar manner to how all of the other products (energy, coal, emission allowances, etc.) are handled. Duke Energy Ohio uses its CBM to analyze its options regarding FTR. However, since there is not such thing as a day ahead market, the results are viewed on a monthly basis and adjustments (transactions) only made on a monthly, quarterly, or annual basis.

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[7] / http://www.pjm.com/~/media/documents/manuals/m06.ashx
[8] / http://www.pjm.com/~/media/documents/manuals/m35.ashx

Finding VIII-3 Duke Energy Ohio exercises what control it has over MISO imposed charges through its participation on MISO committees.

Duke Energy Corporation is a Transmission Owning member of the Midwest ISO and a signatory to the Transmission Owners' Agreement. Duke Energy Ohio via the Midwest Commercial Generation group (MCG) actively participates in and/or monitors the following MISO committees, work groups and task forces.

1. Advisory Committee
2. Market Subcommittee
   a. Revenue Sufficiency Guarantee Task Force
   b. Supply Adequacy Working Group
   c. FTR Working Group
   d. Minimum Generation Task Force
   e. Demand Response Working Group
   f. Market Settlements Working Group
3. Planning Advisory Committee
   a. Loss of Load Expectation Working Group
   b. Interconnection Process Task Force
4. Reliability Subcommittee
5. Steering Committee
6. RECB Task Force
7. Tariff and Business Practices Subcommittee
8. Stakeholder Governance Working Group

Each committee has a written charter which identifies the committee's mission statement, sunset provisions, meeting frequency, quorum and voting requirements, membership, and deliverables. Some of these groups and many of the other committees, working groups, and task forces are attended by other representatives of Duke Energy. Each MISO meeting has a posted agenda and a packet of discussion materials that Duke Energy Ohio personnel review to assess any potential impact. Duke Energy Ohio coordinates any response as a member of the specific committee.

Duke Energy Corporation is a Generation Owning member of the PJM Interconnection, LLC and a signatory to PJM Operating Agreement. Duke Energy Business Services on behalf of Duke Energy Ohio via MCG actively participates in and/or monitors numerous PJM committees, work groups and task forces.

C. Recommendations

None

IX. Financial Review

This chapter addresses Schumaker & Company's financial review of the price to compare (PTC)/fuel and purchased power (FPP) rider and the service resource adequacy (SRA)/system reliability tracker (SRT) rider of Duke Energy Ohio for the January 1, 2011 to December 31, 2011 period. In this report, these riders will be referred to as the FPP and SRT riders.

The scope of financial review services includes the following components:

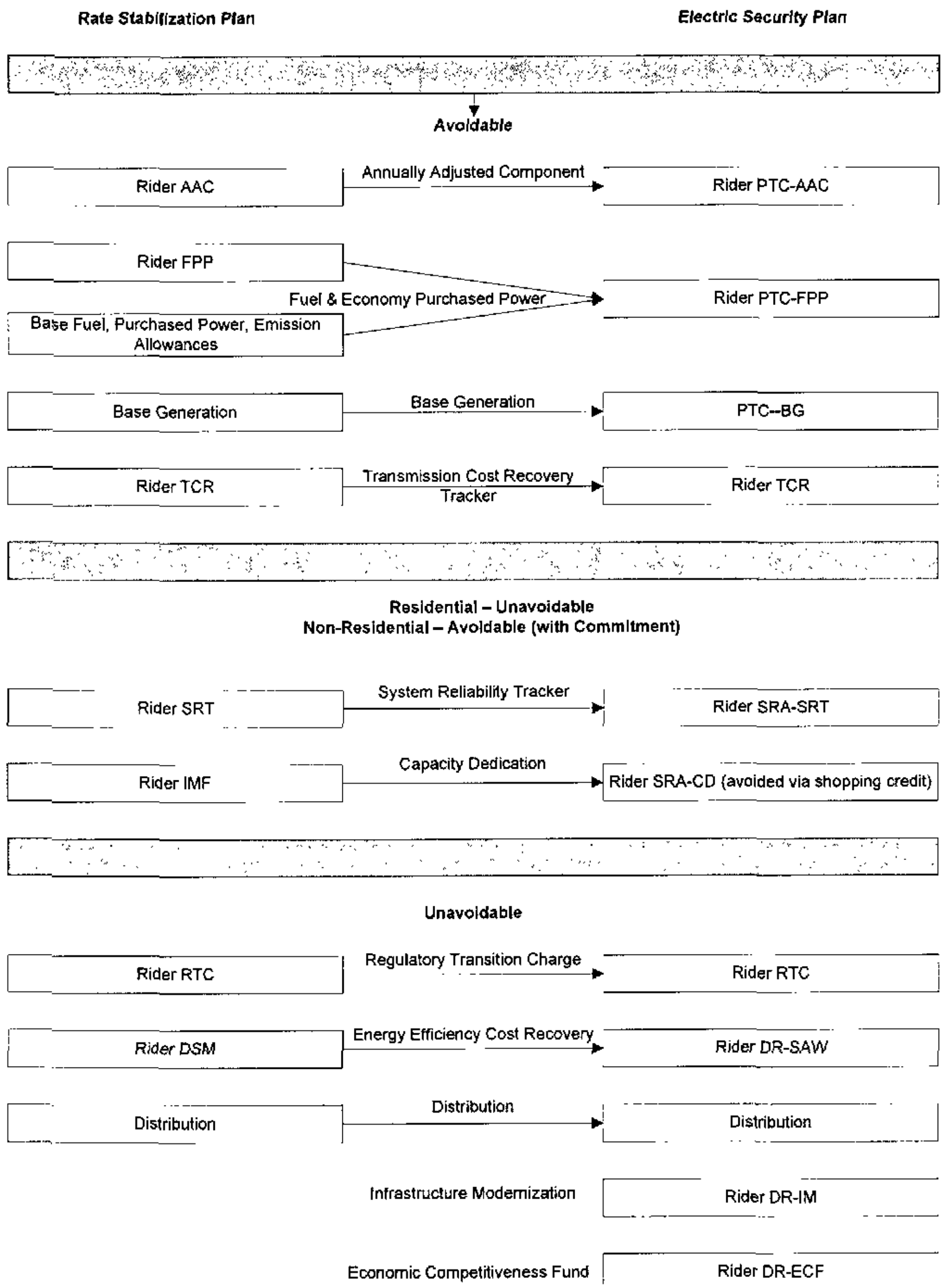
- All cost elements of Duke Energy Ohio's fuel clause, specifically its price to compare fuel and purchased power rider, was audited and reviewed for accuracy and compliance to ensure that only appropriate costs are being recovered from retail ratepayers. Included in the investigation was a review of the MISO-related and PJM-related charges that are included in the PTC-FPP, which includes a review of congestion costs/revenues, financial transmission rights revenues/costs, net marginal losses, marginal loss surplus distribution, and revenue sufficiency guarantee (RSG) make-whole payments.
  - Review and report on costs incurred/revenues received in each area.
  - Verify consistency of costs/revenues with actual Midwest ISO invoices.
  - Verify that the company is passing through charges, and all appropriate revenues, associated only with serving retail load customers in Ohio.
- All cost elements of Duke Energy Ohio's SRT rider were audited and reviewed for accuracy and compliance to ensure that only appropriate costs are being recovered from retail ratepayers.

A. Overall Background and Perspective

Previously, Duke Energy Ohio, like other Ohio electric utilities, was required to submit and follow a rate stabilization plan (RSP). Duke Energy Ohio's RSP was approved in November 2004 and established for a three-year term of January 2005 through December 31, 2008. Then in July 2008, Duke Energy Ohio filed a three-year electric security plan (ESP) to comply with Senate Bill (SB) 221. A settlement with the intervening parties was reached in October 2008. A hearing was held during November 2008 and the Public Utilities Commission of Ohio (PUCO) approved the ESP in December 2008. The ESP rates became effective January 1, 2009 through December 31, 2011.

Exhibit IX-1 illustrates the riders included in the ESP versus those previously included in the RSP.

Exhibit IX-1
ESP Versus RSP
January 1, 2009 to December 31, 2011



Source: February 23, 2010 Duke Energy Ohio presentation titled "Electric Security Plan – Standard Service Offer and Distribution Rates Update" given by Jim Ziolkowski, Rates Manager.

As part of the ESP implementation, both the FPP and SRT filings were instituted as follows:

> "By opinion and order issued December 17, 2008, *In the Matter of the Application of Duke Energy Ohio, Inc., for Approval of an Electric Security Plan*, Case No. 08-920-EL-SSO, et. al, the Commission approved a stipulation submitted by the parties in that case, as well as an annual audit process which would require Duke to file quarterly reports and to make a filing in the first quarter of each year regarding the audits for riders price-to-compare (PTC)-FPP and system resource adequacy (SRA)-SRT, formerly known as riders FPP and SRT."

The FPP and SRT riders will no longer be in effect after December 31, 2011, as the ESP has been eliminated and replaced with an auction process. A RECON rider has been established by the PUCO, in which the rider recovers costs necessary to true up revenue collected under the FPP and SRT riders with actual costs associated with each of these two riders through December 31, 2011. The RECON rider will start on April 1, 2012 and cover both the third and fourth quarters of 2011. It will terminate when the net over- and/or under-recovery balances for the FPP and SRT riders are eliminated but no later than two quarters after the filing of the final entry in the docket initiated by the Commission for purposes of conducting a final audit of these riders. Duke Energy Ohio has made its first RECON rider filing on February 28, 2012 covering the period April 2012 through June 2012. Other filings will occur, as appropriate, in later quarters.

Organizational Structure and Staffing

This section briefly discusses the various Duke groups involved in activities that impact the FPP and SRT rider filings.

Midwest Commercial Generation

The Midwest Commercial Generation (MCG) organization of Duke Energy Ohio is responsible for managing the power, fuel, and emission allowance positions for Duke Energy Ohio's operating units, including its Ohio generation portfolio. The aim of this management is to provide a reliable, low-cost, market-based supply of electricity for Ohio customers.

The MCG organization is responsible for establishing and implementing the multi-commodity risk management strategy for power, fuel, and emission allowances by monitoring and adjusting the contract mix all the way through physical delivery. These adjustments result in the purchases or sales of fuel, emission allowances, and power for the approved term if the forward market allows them to transact.

Fuel (coal) purchases are made through a combination of long-term and spot-market purchases. The MCG Fuel Procurement and Logistic groups are responsible for evaluating proposals for: fuel and transportation contracts; selecting and qualifying suppliers and shippers; contract negotiation; administration and enforcement; and ongoing transportation maintenance and operations support. The MCG organization is also responsible for complying with fuel procurement regulations.

The MCG organization is responsible for evaluating its fuel and transportation services practices on a continuing basis and for updating them as needed. Duke Energy Ohio management believes that this continuous self-evaluation ensures that the MCG organization follows the best available practices as they relate to the changing business environment of Duke Energy Ohio and the industry, the effect of state and/or federal legislation, the orders or rules of any state commission, or any other event that may impact Duke Energy Ohio's procurement and use of fuel. Duke Energy Ohio management also believes that a balancing of short-term and long-term contracts is an effective way to achieve critical portfolio goals, such as:

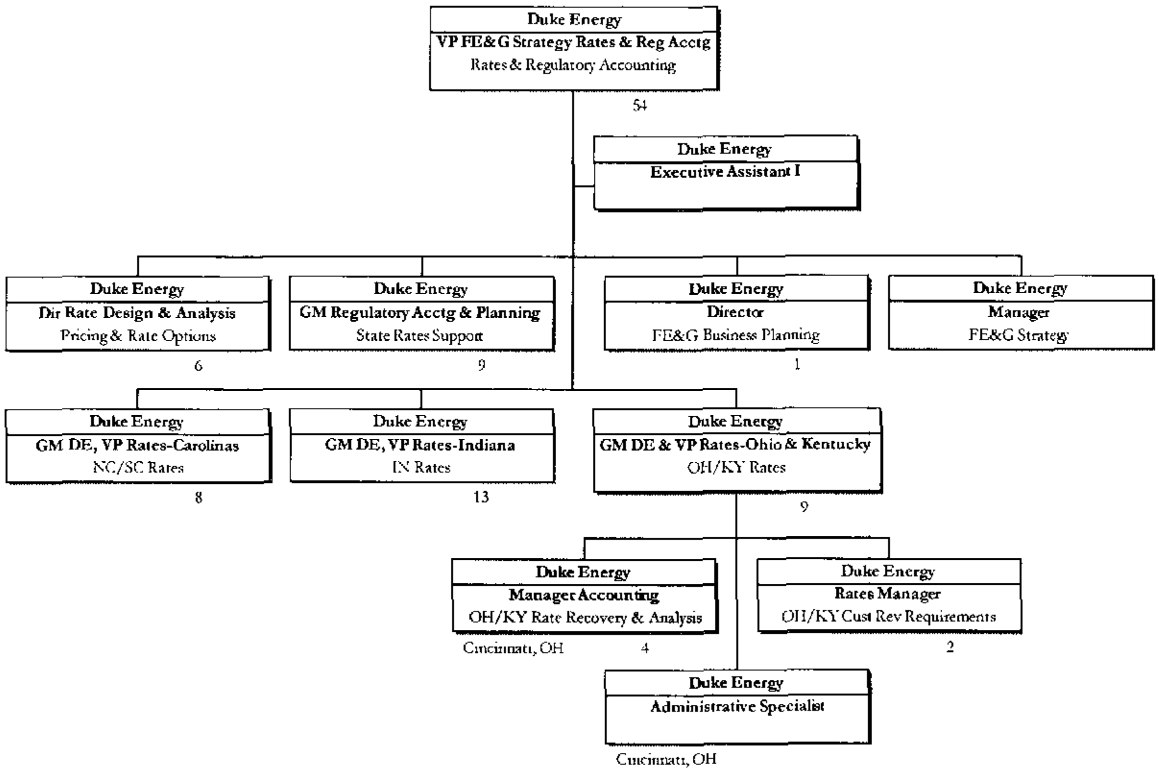
- Effective management of market price risk
- Assurance of adequate and appropriate supply from reliable suppliers
- Competitive pricing
- Market intelligence
- Continuing evaluation of suppliers
- Flexibility in responding to changing market or economic conditions
- Efficient delivery of shipments and contract administration
- Coal basin balance and diversity

In performing its fuel procurement activities, the MCG organization makes every effort to purchase fuels that are compatible with all Ohio generation portfolios. This decision-making process also heavily involves inputs from all station managers. Furthermore, the cost of complying with environmental regulations regarding emissions is factored into purchasing decisions. Coal quality specifications may include moisture, ash, calorific value, sulfur, volatility, grindability, chlorine, mineral ash analysis, and fusion temperature to assure that the purchased coal will be compatible with equipment operation and environmental regulations. Quality price adjustments are made for deliveries not within contract specifications. For longer-term commitments, suppliers are generally evaluated on the basis of delivered cost (adjusted for MMBtu, SO_2, and freight), credit strength, proximity to transportation, and willingness to extend commercial terms. Additional evaluation is conducted, as needed, concerning byproduct handling, disposal, and various environmental limits at the station sites. For short-term purchases, the evaluation focuses primarily on evaluated cost relative to the market.

Rates & Regulatory Accounting

The Rates & Regulatory Accounting organization, as shown in *Exhibit IX-2*, is responsible for the FPP/SRT filings to PUCO.

Exhibit IX-2
Rates & Regulatory Accounting Organization
as of December 31, 2011

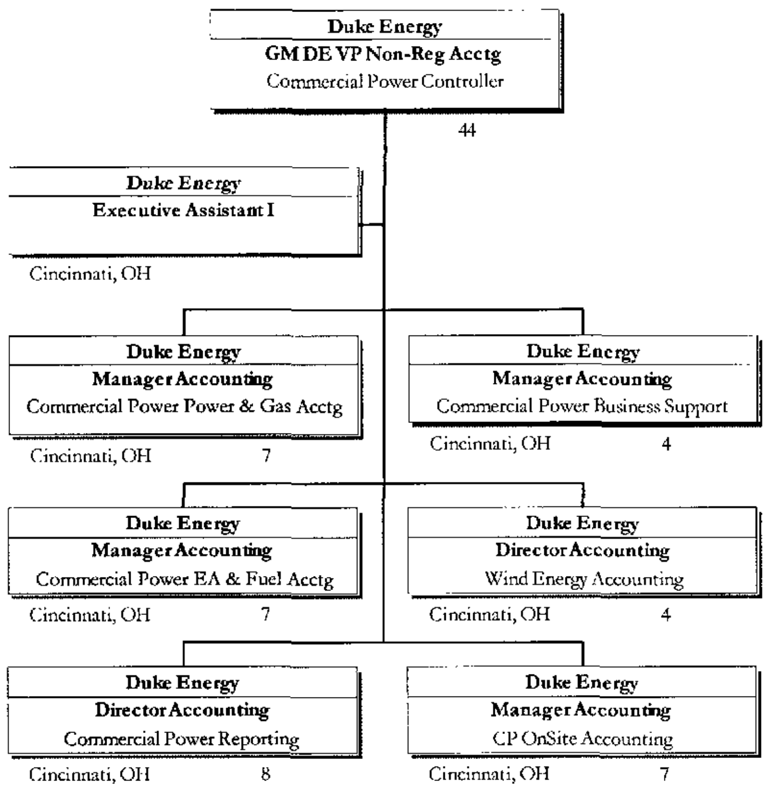


Source: Information Response 242

Commercial Power Accounting

The Commercial Power Accounting organization, as shown in *Exhibit IX-3*, is responsible for the provision of accounting data that goes into these filings.[161]

Exhibit IX-3
Commercial Power Accounting Organization
as of December 31, 2011



Source: Information Response 242

Those groups primarily responsible include the following within the Commercial Power Accounting organization:[162]

- Commercial Power – Power & Gas Accounting
- Commercial Power – Emission Allowance (EA) & Fuel Accounting
- Commercial Power Reporting – Management Reporting and Regulatory Filing

The systems used by these groups include PeopleSoft, Business Objects, CommoditiesXL (CXL), and nMarket, as follows:[163]

- *PeopleSoft*: PeopleSoft is the general ledger system used by all Duke entities, including Duke Energy Ohio.
- *Business Objects*: This application is a general ledger reporting application.
- *CXL*: Duke Energy Ohio's trading and settlement/fuel/EA accounting functions use the Commodity XL (CXL) system. This multi-commodity trading platform supports front-to-back office processes (trade capture, confirmation, scheduling, logistics, settlement, cash receivables/payables, and accounting) into a single scalable and customizable platform. Triple Point Technologies was the CXL vendor, although the code for the system has now been purchased by Duke, which the Duke Information Technology (IT) group now supports. In 2011 several changes were included in CXL's use:
  - "Spread Option" models are not being used, because Duke Energy Ohio is not currently transacting in this fashion.
  - As Duke Energy Ohio began using CXL for supporting RECS:
    - The company began recording receipt of RECs in CXL in addition to emission allowances, which CXL previously did.
    - CXL also has the ability to capture REC compliance target positions and REC inventory to support management of the REC supply/demand position.
  - In 2011 formula-based pricing was extended to other commodities (gas and power) other than what is was originally implemented for (coal) in 2009.
- *nMarket*: This application is a client server application that provides an integrated, modular toolset that enables communication to independent system operator (ISO)/regional transmission organization (RTO) markets. It allows Duke Energy Ohio to interact with MISO, including the shadowing of MISO transactions. Duke Energy Ohio's front office staff uses nMarket for bidding, nominations, scheduling, and dispatch. Settlements functionality within the tool allows the downloading of ISO statements and invoices for comparison to internally generated estimates.

Each of these groups is further described in the following sections.

Commercial Power – Power & Gas Accounting

The Pool Settlements & Accounting group, which is comprised of a Lead Accounting Analyst and three other employees, is responsible for all power market settlements involving independent system operators (ISOs), including:

- MISO
- PJM Interconnections (PJM)
- Electric Reliability Council of Texas (ERCOT) (primarily for wind energy)

The group interacts with the Generation Dispatch and Operations (also referred to as the front office) and the IT organizations to perform its duties, which include:

- Verifying settlements and resettlements on a daily basis by using the nMarket system to "shadow" the MISO transactions
- Managing disputes with MISO
- Participating in settlement meetings
- Developing accounting entries during the monthly accounting close process
- Assisting other Commercial Power Accounting staff with settlement and resettlement issues

The Bilateral Settlements and Accounting group, which is comprised of a Lead Accounting Analyst and two other employees, is responsible for all power market settlements involving any entity other than MISO.

Regarding bilateral and MISO settlements:

- If payment is due from Duke, requests for payment (RFPs) are sent to the CXL Accounts Payable (A/P) work group. The deal will be closed out when the invoice arrives from the counterparty (or is self-invoiced by Duke) and is paid by the bank. In addition to the weekly MISO invoices, there are approximately 20 to 60 A/P transactions per month.
- If payment is due to Duke, information is sent to the CXL Accounts Receivable (A/R) group. Likewise, payments to Duke will be monitored and verified until the transaction is completed. There are approximately 20 to 60 A/R transactions per month.

Transactions from CXL automatically feed the PeopleSoft general accounting system.

Commercial Power –EA & Fuel Accounting

The EA & Fuel Accounting group is responsible for settlements, accounting, payments, cash processing, reporting, contracts, and confirmations regarding fuel and emission allowances. Five staff members, along with the manager of this group, work on settlements, accounting, payments, cash processing, and reporting activities, while two staff members work primarily on contracts and confirmations. Regarding contracts and confirmations, the terms for all trades performed are included in contracts, which are set in place before a trade is executed. These two staff members verify that there is a contract and that the trade terms follow the contract specifications. They also confirm that the trade has taken place.

Commercial Power Reporting – Management Reporting and Regulatory Filing

This group, which was comprised of two employees on December 31, 2009, at 2011 year-end only has one employee, a Lead Accounting Analyst. The Lead Accounting Analyst is responsible for the consolidation of the data provided by the other two groups and for providing them to the Rates and

Regulatory Filing organization for inclusion in FPP/SRT filings. Among the Lead Accounting Analyst's duties and responsibilities are the following:

- Allocation of realized generation between native and non-native on a daily basis
- Development of a profit and loss statement on a weekly basis for the MCG organization
- Providing filing assistance, including:
  - Responding to data responses
  - Assembling SRT, FPP, transmission cost recovery (TCR), and annually adjusted component (AAC) rider data for PUCO filings
- Accounting and management support for public information (such as the 10Q and 10K SEC filings) and press releases for the commercial business unit within Duke

Sarbanes-Oxley (SOX) Controls and Internal Audits Involving FPP and SRT

SOX Controls

An Internal Controls (I/C) group, located in Charlotte (NC), and is responsible for SOX 404 financial reporting activities, including:

- Working with business units to identify controls
- Updating documentation (April/May/June)
- Testing (June/July/August/September/October/November/December)
- Evaluating failed items, if any, and determining if significant deficiencies or material weaknesses exist

Before starting tests in the June to December time period, the I/C group develops its plan for the upcoming year by:

- Assessment of materiality for inclusion
- Creating a risk assessment memo by looking at account risks for financial statement line items (based on activity, details of activity, quantitative measures, and qualitative factors) and internal controls failure risks as a means to rank accounts for SOX testing
- Making sure SOX documentation is updated properly by business owners within the business unit responsible for the control activity
- Making sure testing plans incorporate any changes

The actual testing is done by the process owner (not the person specifically responsible for performing activity on a routine basis, but someone within the process owner's organization), although occasionally an Internal Audit (I/A) employee may do the testing if there is overlap between IA's work and the SOX test process, then it is reviewed by an I/C employee. In 2011, five of the eight SOX tests, which potentially impacted FPP and/or SRT accounting, were performed by the IA group and three by process owners. Although the process owners were the individuals directly responsible for the tested activities, as the tester they implement and document the test, but the Corporate SOX Cycle Lead reviews the test workbook, which includes test documentation to ensure the test accuracy and the control effectiveness, then signs off the test. The I/C group continues to use the Open Pages software, which it implemented in 2005 and last upgraded in 2010, for tracking testing plans and results.

Duke's external auditors do their own SOX testing, but does not share test results with the I/C group, but does share errors when applicable. For 2011, there were no errors found by the external auditors. The I/C group meets monthly with the external auditors in May and then from July to February when testing is being performed. During these meetings, the I/C group updates the external auditors with the status of internal SOX testing activities.

Although regulatory filings are considered compliance reporting and are not specifically addressed within the SOX controls, Duke Energy Ohio has 21 key SOX controls involving the Commercial Asset Management Department and its PUCO filings impacting FPP and SRT riders, which is up from 20 in 2009 and 17 in 2010. Five additional SOX controls were determined in 2011 to be key controls and one was removed. Duke Energy determined that one control (TRC-MDL02) was not a key control and inadvertently included in the 2010 response to Schumaker & Company consultants. Four coal inventory controls (INVF-ICST09, INVF-ICST10, INVG-QA03a, and INV-RMSF04a), were revised to incorporate a process improvement made at the stations during 2011 resulting in their inclusion as new key controls. Also another key control dealing with a monthly comparison between MW generated plus net purchases from MISO to the amount of MW billed provided by revenue accounting minus a standard line loss factor, in which variances are investigated (TRC-SA25) was determined to be potentially related to FPP activities.

These 21 SOX controls include the following sub-processes:

- Data Modeling and Analytics
- Settlement (Power)
- Settlement (Coal)
- Cost and Issue Inventory
- Settlement – Emission Allowance
- Emission Allowance Master File Data and Cost and Usage of Emissions
- MISO Market Settlement, including daily, weekly, and monthly processes

Eight of the SOX controls relevant to the FPP and SRT filings were tested in the 2011 time period, seven tests using the observation test methodology and one test using the direct testing methodology. The Internal Controls group gave a "pass" to all eight tests. *Exhibit IX-4* illustrates Duke Energy's approach to assigning test methodologies to test the effectiveness of SOX controls based on account risk and internal control failure risk. Duke Energy relies on entry-level controls (ELCs) and indirect company-level controls (indirect CLCs) for its low risk activities; therefore, no testing is typically done for these activities. Observation testing is typically used for some medium risk activities and consists of interviewing personnel responsible for performing the control, observing how the control is conducted, and reviewing documentation of the test process and the test results. Direct testing is typically used for other medium risk activities and all high risk activities. The direct test methodology, if used, involves selecting a random sample and performing the control process to verify the results of the process. The number of sampled items depends on the frequency of the activity, which is generally one if quarterly, two if monthly, three or more if weekly, and 25 if daily.

Exhibit IX-4
Risk Ranking By Identifying Test Methodology Based On Account and Internal Control Failure Risk
2011

ACCOUNT RISK	H			
	M	Observation	Observation	
	L	N/A Reliance on ELCs and indirect ELCs	N/A Reliance on ELCs and indirect ELCs	N/A Reliance on ELCs and indirect ELCs
		L	M	H
		INTERNAL CONTROL FAILURE RISK		

Source: Information Response 309
Account risk is based on account activity and detail (operation and financial activities, identified changes, and identification of related accounts that impact the line item), quantitative assessment (identification of current year planned activity and project activity), and qualitative assessment (includes risk factors as level of judgment, susceptibility to fraud, accounting complexity, and environmental factors).
Internal control failure risk is subjective but is based on a multitude of considerations, including:

Low	Automated control or control with little subjectivity or complexity; stable control/area with little to no change/ little to no history of control failure
Medium	New control that has not been proven yet to operate effectively; changes in personnel, processes, or related systems affecting the control operation; more complex control that is subjective in nature
High	Complex and highly subjective in nature, large amount of change in control and surrounding control environment; history of failure

In the course of the fieldwork for this audit, the Schumaker & Company auditors reviewed the SOX business process flowcharts, the SOX controls in the FPP and SRT compilation and filing areas, and the SOX tests conducted. All were evaluated for appropriateness, completeness, and effectiveness.

Internal Audit

Duke's Internal Audit group (I/A), referred to as the Corporate Audit Services, Ethics, and Compliance group, is located in Charlotte (NC). Generally the I/A function is performed by internal Duke employees, although external subject matter experts are sometimes used. The IA group is led by a Vice President (VP) and has 35 employees reporting to the VP. The IA group has three sub-groups:

- Corporate Services (financial and operational audits)
- Franchised Electric & Gas (FE&G) (audits related to Duke's FE&G work units)
- Information Technology (IT) (technology audits)

In developing each year's audit plan, the I/A group uses a risk-based approach in which it develops risk by reviewing prior audits, identifying other known issues, and conducting interviews with roughly 20 key executives. A risk assessment is developed by business unit (BU) and discussed in an all-day session that includes the audit team (managers, directors, and the VP) and generates a "heat map," which is a risk framework for the company (risks by BU) that leads to the development of an audit plan. The proposed audit plan is vetted (by the VP of the audit group) with the other Duke executives prior to being presented to the Duke Audit Committee for review and approval. The Audit Committee members typically ask probing questions regarding areas they see as risks; the Audit Committee will also go into executive session to discuss more sensitive issues with the VP.

The IA group also walks Duke's external auditors through the risk assessment and audit plan; subsequently, the external auditors are invited once monthly to the IA group's weekly meetings.

Most audits are focused on whether policies and procedures are effective and being followed, although they may also identify enhancement opportunities. The typical audit steps include:

- Work with business unit about timing of audit.
- Rollout to management
- Director, manager, and lead auditor perform planning and have initial discussions with business unit to finalize timing and scope.
- Audit announcement occurs.
- Preliminary work is done to gather background information.
- Initial data requests are made.
- Electronic work papers/initiation occurs.
- Field work through testing is performed.
- Status updates are done.
- Exit conference/draft report (findings if report not yet available) are discussed with business unit.
- A management response from the business unit is received.
- The final report is issued.

- An electronic database (TeamMate) is used to track response, priority, implementation date, and whether SOX or not for each recommendation.
- I/A checks progress.
- I/A also performs a formal follow-up.
- I/A discusses open issues with the Duke Board of Directors (BOD) Audit Committee, especially with regard to if they are done, delayed, or overdue.

The IA group performed three audits in 2009 involving purchased power or fuel costs and coal contracts and invoices. These audits encompassed larger areas than those covered in this audit and included a portfolio optimization report (performed every two years and issued July 24, 2009), front-office processes (report issued December 18, 2009), and coal processes (report issued March 1, 2010). These audits were reviewed by Schumaker & Company for any issues relative to the filing of the FPP and SRT rates. Subsequently, in 2010, no additional audits involving purchased power or fuel costs, including FPP, SRT, and coal contracts/invoices, have been performed or issued by the I/A group.

In 2011, two audits impacting the FPP and/or SRT riders were conducted:

- An operational audit was performed in 2011 regarding renewable energy credit (REC) tracking, in which recommendations were to be implemented by July 31, 2011. At the time of our 2011 audit in early 2012, the IA group had followed-up on this audit and closed it out, as all of the recommendations concerning issues involving processes to review individual access and inconsistent usage of a central repository for REC information had been addressed:
- A commercial asset management (CAM) audit was performed, in which recommendations were to be implemented by December 31, 2011. At the time of our 2011 audit in early 2012, the IA group had followed-up on this audit and closed it out, as all of the identified items concerning risk management oversight, risk management dashboard, and trade verification had been addressed:

The IA group has two following audits scheduled for completion in 2012 whose scopes could be related to purchased power/ fuels, although they are not specific to OH and would not include the regulatory filing processes.

- Fuel flexibility and procurement program
- Regulated Portfolio Optimization (RPO) operations

B. Fuel and Purchased Power Rider

This section reviews and assesses implementation of the fuel and purchased power rider by Duke Energy Ohio for the January 1, 2011 to December 31, 2011 period. It includes Schumaker & Company's testing of FPP data.

Background and Perspective

Duke's fuel costs for 2011 are to be recovered through Rider PTC-FPP (fuel, purchased power, and emission allowances) rates that are included on monthly rate-payers' bills. Rider FPP charges are for Duke's costs related to fuel, off-system power purchases, and emission allowances to provide electric generation service to its customers. (Starting in the fourth quarter of 2009, in addition to emission allowances, it also included alternative energy portfolio standard costs; and in 2010 and 2011, it included environmental reagent costs as well.) The FPP charge is applicable to all customers except those who receive generation service from a certified supplier. Prior to the ESP, the FPP rider was designed to capture the difference between the current and baseline amounts for fuel and emission costs. Starting in 2009 with the ESP, the base fuel and EA amounts were moved to the FPP rider. The FPP rider is calculated monthly on a projected basis, and the FPP rate is revised and trued up quarterly (again on a projected basis) with a filing to PUCO. The FPP component of Duke's residential billing rate averaged $0.030133 in 2011 and comprised 25.03% of the average total residential billing rate, as shown in *Exhibit IX-5*.

Exhibit IX-5
Average Components of Residential Billing Rate
as of December 31, 2011

	1Q2011	2Q 2011	3Q 2011	4Q 2011	Monthly Average	% of Total
Generation First 1000 kWh	$0.042345	$0.042345	$0.042345	$0.042345	$0.042345	35.17%
Rider AAC First 1000 kWh	$0.008926	$0.008926	$0.008926	$0.008926	$0.008926	7.41%
Rider SRA-CD First 1000 kWh	$0.002651	$0.002651	$0.002651	$0.002651	$0.002651	2.20%
Rider SRT	**$0.000007**	**$0.000023**	**$0.000038**	**$0.000078**	**$0.000037**	**0.03%**
Rider FPP	**$0.030399**	**$0.024955**	**$0.032042**	**$0.033137**	**$0.030133**	**25.03%**
Rider DR-SAWR	$0.000928	$0.000928	$0.000928	$0.000928	$0.000928	0.77%
						0.00%
Distribution Charge	$0.022126	$0.022126	$0.022126	$0.022126	$0.022126	18.38%
Rider TCR All kWh	$0.006221	$0.006221	$0.006221	$0.006365	$0.006257	5.20%
						0.00%
Rider OET First 2000 kWh	$0.004650	$0.004650	$0.004650	$0.004650	$0.004650	3.86%
Rider USR First 833,000 kWh	$0.001502	$0.001502	$0.001502	$0.001502	$0.001502	1.25%
Rider UE-ED all kWh	$0.000764	$0.000764	$0.000764	$0.001174	$0.000832	0.69%
						100.00%

Source: Information Responses 250
Per bill customer charges have been excluded in above calculations, plus only those items relative to a residential bill that is typically under 1,000 kWh are included.
An example of an excluded charge, as it is a per customer charge, is the charge to all retail jurisdictional customers through March 31, 2014 to recover the revenue requirement associated with costs incurred by the Duke Energy Ohio due to Hurricane Ike.

The customer base for the FPP rider consists of three types: residential, non-residential, and voltage reduction. Residential and non-residential customers are distribution customers, while voltage reduction customers are transmission customers. The FPP rate, as proposed in the quarterly PUCO filings for 2011 for each of these types of customers, is shown in *Exhibit IX-6*.

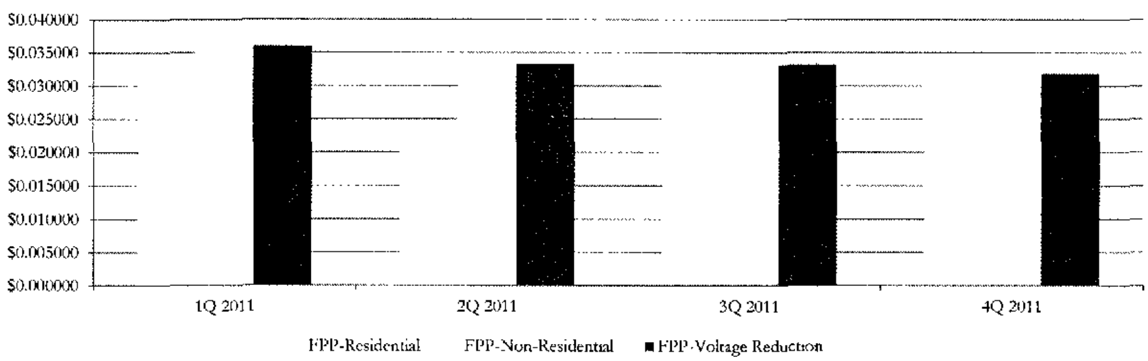
Exhibit IX-6
FPP Rate by Quarter and by Type of Customer
2011

	1Q 2011	2Q 2011	3Q 2011	4Q 2011
FPP-Residential	$0.030399	$0.024955	$0.032042	$0.033137
FPP-Non-Residential	$0.036473	$0.033868	$0.033743	$0.032402
FPP-Voltage Reduction	$0.035986	$0.033312	$0.033227	$0.031926

Source: Information Responses 196 and 248

The FFP data reflecting rates by type of customer for this same time period is shown graphically in *Exhibit IX-7*.

Exhibit IX-7
FPP Rate by Quarter and by Type of Customer
2011



Source: Information Responses 196 and 248

FPP Components

The FPP rate as filed with PUCO for 2011 was comprised of the following components:

- *Fuel Cost* (FC) – a forecast of cost (fuel, purchased power, and price hedges) associated with the expected electric load for the upcoming quarter.
- *Emission Allowance* (EA) – emission cost associated with the expected electric load.
- *Reconciliation Adjustment* (RA) – reconciliation between actual and projected fuel cost and emission allowances.

- *System Loss Adjustment* (SLA) – projected loss of energy between generation and delivery to the final customer.
- *Alternative Energy Portfolio Standard (AEPS)* – composed of annual projected includable alternative energy resource costs, as required by Ohio Revised Code 4928.64.
- *Environmental Reagents* (ER) -- composed of three months' projected includable environmental reagent costs, as required by the stipulation in Case No. 09-770-EL-UNC.

The individual rates that apply to the individual components of Duke's FPP rate for 2011 are shown in *Exhibit IX-8*.

Exhibit IX-8
FFP Components
2011

		FPP Components		
Time Period	**Component**	**Residential**	**Non-Residential**	**Voltage Reduction**
1st Quarter 2011	Fuel Cost	2.8460	2.8460	2.8460
	Emission Allowance	0.0228	0.0228	0.0228
	Alternative Energy Portfolio Standard	0.0358	0.0358	0.0358
	Environmental Reagents	0.1412	0.1412	0.1412
	Reconciliation Adjustment	(0.1057)	0.5017	0.5017
	System Loss Adjustment	0.0998	0.0998	0.0511
	Total FPP Rate ¢/kWh	3.0399	3.6473	3.5986
2nd Quarter 2011	Fuel Cost	3.0324	3.0324	3.0324
	Emission Allowance	0.0192	0.0192	0.0192
	Alternative Energy Portfolio Standard	0.0339	0.0339	0.0339
	Environmental Reagents	0.1670	0.1670	0.1670
	Reconciliation Adjustment	(0.8709)	0.0204	0.0204
	System Loss Adjustment	0.1139	0.1139	0.0583
	Total FPP Rate ¢/kWh	2.4955	3.3868	3.3312
3rd Quarter 2011	Fuel Cost	2.9260	2.9260	2.9260
	Emission Allowance	0.0173	0.0173	0.0173
	Alternative Energy Portfolio Standard	0.0350	0.0350	0.0350
	Environmental Reagents	0.1946	0.1946	0.1946
	Reconciliation Adjustment	(0.0745)	0.0956	0.0956
	System Loss Adjustment	0.1058	0.1058	0.0542
	Total FPP Rate ¢/kWh	3.2042	3.3743	3.3227
4th Quarter 2011	Fuel Cost	2.8154	2.8154	2.8154
	Emission Allowance	0.0166	0.0166	0.0166
	Alternative Energy Portfolio Standard	0.1359	0.1359	0.1359
	Environmental Reagents	0.0341	0.0341	0.0341
	Reconciliation Adjustment	0.2143	0.1408	0.1408
	System Loss Adjustment	0.0974	0.0974	0.0498
	Total FPP Rate ¢/kWh	3.3137	3.2402	3.1926

Source: Information Responses 196 and 248

Fuel Cost Component

The FC component is composed of three months of projected includable fuel costs and economy purchased power data. The FC component by customer type included in the Duke Energy Ohio quarterly FPP filings for 2011 are shown in *Exhibit IX-9.*

Exhibit IX-9
FC Rate Projections
January 1, 2011 – December 31, 2011

FC Rate Projections	Q1 2011	Q2 2011	Q3 2011	Q4 2011
Projected Fuel Cost	$55,397,095	$47,299,392	$55,629,044	$42,008,383
Projected Load (kWh)	1,946,504,607	1,559,794,153	1,901,210,819	1,492,072,119
Total Fuel Rate ($/kWh)	0.028459781	0.030324124	0.029259798	0.028154392
Total Fuel Rate (¢/kWh)	2.8460	3.0324	2.9260	2.8154

Source: Information Responses 196 and 248

Emission Allowances Component

The proposed EA, AEPS, and ER of the quarterly FPP rate is composed of three months' projected includable emission allowance data. The total EA calculated portion of the FPP as filed quarterly with the PUCO is shown in *Exhibit IX-10.*

Exhibit IX-10
Emission Allowance Rate Projections
January 1, 2011 – December 31, 2011

EA Rate Projections	Q1 2011	Q2 2011	Q3 2011	Q4 2011
Projected Emission Allowance Cost	$429,729	$290,278	$318,900	$240,189
Projected Load (kWh)	1,888,109,469	1,513,000,329	1,844,174,495	1,447,309,956
Total Emission Allowance Rate ($/kWh)	0.000227598	0.000191856	0.000172923	0.000165955
Emission Allowance Rate (¢/kWh)	0.0228	0.0192	0.0173	0.0166
Projected Alternative Energy Portfolio Standard Cost	$676,176	$512,162	$645,146	$1,966,409
Projected Load (kWh)	1,888,109,469	1,513,000,329	1,844,174,495	1,447,309,956
Projected Alternative Energy Portfolio Std. ($/kWh)	0.0004	0.0003	0.0003	0.0014
Projected Alternative Energy Portfolio Standard Rate (¢/kWh)	0.0358	0.0339	0.0350	0.1359
Projected Environmental Reagents Cost	$2,665,915	$2,527,245	$3,588,149	$493,802
Projected Load (kWh)	1,888,109,469	1,513,000,329	1,844,174,495	1,447,309,956
Projected Alternative Energy Portfolio Std. ($/kWh)	0.0014	0.0017	0.0019	0.0003
Projected Environmental Reagents Rate (¢/kWh)	0.1412	0.1670	0.1946	0.0341

Source: Information Responses 196 and 248

Reconciliation Adjustment Component

The RA component represents a true-up between the projected and actual FC and EA components experienced. The RA for 2011 is shown in *Exhibit IX-11*.

Exhibit IX-11
Reconciliation Adjustments
January 1, 2011 – December 31, 2011

		Reconciliation Adjustments	
Time Period	**Component**	**Residential**	**Non-Residential**
1st Quarter 2011	Current Period Adjustment	($1,505,322.94)	$3,276,339.75
	Deferred to Future Period	$0.00	$0.00
	Prior Period Adjustment	$0.00	$0.00
	Total Adjustment	($1,505,322.94)	$3,276,339.75
	Predicted Load	1,423,723,000	653,104,000
	Net RA in FPP ¢/kWh	(0.1057)	0.5017
2nd Quarter 2011	Current Period Adjustment	($8,916,489.69)	$141,881.92
	Deferred to Future Period	$0.00	$0.00
	Prior Period Adjustment	$0.00	$0.00
	Total Adjustment	($8,916,489.69)	$141,881.92
	Predicted Load	1,023,813,000	695,954,000
	Net RA in FPP ¢/kWh	(0.8709)	0.0204
3rd Quarter 2011	Current Period Adjustment	($887,841.32)	$550,781.29
	Deferred to Future Period	$0.00	$0.00
	Prior Period Adjustment	$0.00	$0.00
	Total Adjustment	($887,841.32)	$550,781.29
	Predicted Load	1,190,969,000	576,034,000
	Net RA in FPP ¢/kWh	(0.0745)	0.0956
4th Quarter 2011	Current Period Adjustment	$1,924,340.84	$737,475.35
	Deferred to Future Period	$0.00	$0.00
	Prior Period Adjustment	$0.00	$0.00
	Total Adjustment	$1,924,340.84	$737,475.35
	Predicted Load	898,115,000	523,690,000
	Net RA in FPP ¢/kWh	0.2143	0.1408

Source: Information Responses 196 and 248 (starting with the fourth quarter of 2009, the total non-residential rate filed with the PUCO included both non-residential and voltage reduction items)

System Loss Adjustment Component

The SLA represents projections of lost energy from the point of generation to delivery to the customer. It is based on a forecast of projected meter load applied to the current FC rate for the upcoming quarter, adjusted for historic losses in market-based standard service offer (MBSSO) along with an adjustment for total system-wide losses. The SLA for 2011 is shown in *Exhibit IX-12*.

Exhibit IX-12
System Loss Adjustments
January 1, 2011 – December 31, 2011

Time Period	Component	System Loss Adjustments		
		Residential	**Non-Residential**	**Voltage Reduction**
1st Quarter 2011	Average Loss Rate	0.1949	0.1949	0.0892
	Losses in MBSSO	(0.1051)	(0.1051)	(0.0481)
	Synchronization Adjustment	0.0100	0.0100	0.0100
	Net SLA in FPP ¢/kWh	0.0998	0.0998	0.0511
2nd Quarter 2011	Average Loss Rate	0.2076	0.2076	0.0950
	Losses in MBSSO	(0.1051)	(0.1051)	(0.0481)
	Synchronization Adjustment	0.0114	0.0114	0.0114
	Net SLA in FPP ¢/kWh	0.1139	0.1139	0.0583
3rd Quarter 2011	Average Loss Rate	0.2003	0.2003	0.0917
	Losses in MBSSO	(0.1051)	(0.1051)	(0.0481)
	Synchronization Adjustment	0.0106	0.0106	0.0106
	Net SLA in FPP ¢/kWh	0.1058	0.1058	0.0542
4th Quarter 2011	Average Loss Rate	0.1928	0.1928	0.0882
	Losses in MBSSO	(0.1051)	(0.1051)	(0.0481)
	Synchronization Adjustment	0.0097	0.0097	0.0097
	Net SLA in FPP ¢/kWh	0.0974	0.0974	0.0498

Source: Information Responses 196 and 248

Overall Audit Objectives and Scope

The overall objectives of the financial review of the FPP rider for 2011 were to:

- Determine that Duke Energy Ohio has procedures in place that are being followed to achieve control of costs associated with processing fuel receipts and consumption transactions; processing energy purchase and sale transactions; processing emission allowances, reconciliation adjustments, and system loss adjustment and that it is accurately calculating the FPP rate, including compliance with the financial procedural aspects of former *Chapter 4901:1—11 of the Administrative Code.*
- Determine whether Duke Energy Ohio's FPP procedures are reasonable and being followed.
- Verify the arithmetic accuracy of the calculation and reporting of allowable cost components (FC, EA, RA, SLA, AEPS, and ER) included in the FPP rate charged to Duke Energy Ohio customers.
- Verify the arithmetic accuracy of Duke Energy Ohio's calculation of the FPP rate, including the difference between actual net revenues and actual net fuel costs.
- Review the procedures and control for assembly and reporting of information in the FPP tariff billing sheets.

- Verify the proper FPP rates were properly applied in customer billings.
- Determine whether the fuel (coal) delivered to Duke Energy Ohio plants meets quality and quantity specifications. (Refer to *Chapter III – Fuel Forecasting & Procurement*)

To address these objectives, Schumaker & Company performed the following activities:

- Interviewed personnel involved with accounting for fuel and purchased power comprising FPP items and developing PUCO filings
- Reviewed quarterly filings and supporting work papers and recomputed the FPP rates during the audit period
  - Reviewed proposed FC, EA, RA, SLA, AEPS, and ER components of the FPP rate
  - Verified the mathematical accuracy of calculations
  - Reviewed the forecasting methods used to project customer loads and associated costs with Duke personnel
  - Verified the entry of the FC, EA, RA, SLA, AEPS, and ER rates into Duke's billing system
  - Reviewed supporting documentation, including:
    - Relevant pages from Duke's general ledger
    - Fuel ledger
    - Purchase orders and invoices
    - Journal entries and supporting data
- Compared recomputed rates to those filed with PUCO
- Traced the recovery of revenues produced from the components of the FPP rate to the sales volumes included in financial statements
- Verified that actual revenues recovered from the total FPP rates were reconciled against the FPP's projected costs
- Randomly selected and tested customer bills from each quarter of the audit period to confirm appropriate application of the FPP rates in Duke Energy Ohio's billing system, as shown below in *Exhibit IX-14*
- Reviewed SOX controls regarding PUCO filings for FPP rate
- Traced process for computing and filing FPP rates through the SOX business process flowcharts
- Reviewed SOX test procedures for completeness and effectiveness
- Reviewed results of SOX tests completed in 2011
- Reviewed Duke internal audits involving power or fuel costs, including FPP, SRT, and coal contracts and invoices

Findings and Conclusions

Finding IX-1 **Schumaker & Company's review of the methodology, calculations, and accounting entries concerning the quarterly filing of the FPP rate disclosed no discrepancies that affected the FPP rate for 2011.**

Schumaker & Company reviewed and recalculated, where appropriate, the work papers, supporting documentation, and accounting entries used to develop, report, and file the FPP rate included in PUCO filings. The mathematical accuracy of calculations was verified, entries were traced to supporting documentation, and rates were recomputed. Also a random sample of customer bills, as shown previously in *Exhibit IX-14*, was examined to verify that the appropriate FPP rate was included on each bill. Revenues and electricity usage were traced to monthly and annual financial reports used for external and internal purposes. Several minor and immaterial calculation discrepancies were discovered, but they did not affect Duke Energy Ohio's accounting and reporting concerning the FPP rate for 2011.

Finding IX-2 **Adjustments totaling $865,036 were identified after the initial RECON rider filing submitted at the end of February 2012.**

The RECON rider was established to true-up the costs and revenues for certain riders being eliminated, including the FPP and SRT riders. The RECON rider allows Duke Energy Ohio to recover from, or credit to, its customers any over-or under-recovery for the FPP and SRT riders, which expired on December 31, 2011. Comparing the actual costs and revenues incurred under these riders, Duke Energy Ohio initially determined that it had under collected in 2011 by $329,278.28 and $97,416.61, respectively, for the FPP and SRT riders. The filing made on February 29, 2012 for the period April 2012 to September 2012 resulted in a charge per kWh of $0.000149.

Subsequent to calculating and filing its RECON charges adjustment, additional costs associated with 2011 were identified by Duke Energy Ohio. These amounted to $865,035.99, being comprised primarily of prior period adjustments for coal unload transfer costs and coal sales, as shown in *Exhibit IX-13*.

Exhibit IX-13
Additional RECON Adjustments Not Included in Initial Filing

Sum of Amt DR/(CR)				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
S105 MISO Period - Sep 11	**27.20**			**27.20**
S105 MISO Period - Oct 11		**(2,471.15)**		**(2,471.15)**
S105 MISO Period - Nov 11			**350.76**	**350.76**
S14 MISO Period - Dec 11	**(812.66)**			**(812.66)**
PPA 2011 - Unload Transfer		**360,041.73**		**360,041.73**
PPA 2011 - Coal Sales	**151,659.54**	**356,240.57**		**507,900.11**
2011	**150,874.08**	**713,811.15**	**350.76**	**865,035.99**

Source: Interview 80

In its application to establish the initial level of the RECON rider (Case No. 12-817-EL-RDR), Duke Energy Ohio included a provision for any additional adjustments (beyond the original RECON calculation) also to be included in the rider. This will necessitate an additional calculation and filing to determine an adjustment to the RECON rider customer charge.

Finding IX-3 One billing kWh discrepancy was noted during bill test sampling.

To verify that the correct FPP and SRT rates had been included on the Duke electric bills, Schumaker & Company reviewed a random sample selection of monthly bills from mid-month and end-of-month bill cycles for the months of March, June, September, and December of 2011. For these months, 99 sample bills were selected, representing 45 different Duke Energy Ohio billing rates. The delivery rider and FPP charges were recalculated and compared to rates included in the quarterly PUCO filings. Statistics regarding the bill testing conducted is shown in *Exhibit IX-14*. A few minor exceptions in 12 items were found, but were explained by Duke Energy Ohio to Schumaker & Company's satisfaction. In only item, in the billing system, distribution kWh was not equal to generation kWh, resulting in a CMS billing error. An IT ticket was opened to research billing issue, but Duke Energy Ohio, but the company could only find an error for this account for the month sampled.

Exhibit IX-14
Sample Bill Testing
2011

Filing Quarter	# Sample Bills	Electricity Usage		Riders Examined	
		Charges ($)	kWh	FPP	SRT
1	25	$279,034	4,431,795	19	20
2	25	$532,068	9,484,011	16	18
3	25	$70,453	2,075,198	18	19
4	24	$124,423	3,137,794	19	21
Total	99	$1,005,978	19,128,798	72	78

Source: Information Responses 266 and 314 and Schumaker & Company Analysis

Recommendations

Recommendation IX-1 **Ensure that RECON rider adjustments are properly incorporated into subsequent filings. (Refer to Recommendation IX-1)**

In any RECON filings made after the completion of this audit report, Duke Energy Ohio should ensure that adjustments not previously incorporated be properly included.

Recommendation IX-2 **Continue to monitor billing situations where kWh data does not match so as to find out what is causing billing issue. (Refer to Finding IX-3)**

Duke Energy Ohio should continue to monitor its bills through use of the Excel spreadsheet provided to identify future situations, if any, where distribution kWh and generation kWh do not match, so as to identify problem and resolve it.

C. System Reliability Tracker Rider

This section reviews and assesses implementation of the SRT rider by Duke Energy Ohio for the January 1, 2011 to December 31, 2011 period, including Schumaker & Company's testing of SRT data.

Background and Perspective

The SRT rider is intended to recover the Duke Energy Ohio system reliability costs the utility incurs in maintaining a sufficient reserve margin to ensure reliable service to its residential and non-residential customers (non-switched load). This rider permits Duke Energy Ohio to apply annually to PUCO for the purchase of capacity to cover peak and reserve capacity requirements and to flow through those actual costs on a dollar-for-dollar basis. It allows Duke Energy Ohio to track and collect costs associated with meeting its MBSSO load obligation plus a planning reserve margin. The SRT rider is updated and filed quarterly based on year-to-date estimates of annual revenues and costs.

In selected situations, Duke Energy Ohio customers may avoid the SRT and receive the shopping credit. Such situations include:

- Residential end-use customers receiving generation service through a governmental aggregator avoid (are waived) the SRT if the governmental aggregator notifies Duke Energy Ohio at least 60 days prior to the start of the governmental aggregation of its intent to place all residential end-use customers served by the aggregation on the Rider SRA-SRT waiver program and agrees to maintain the governmental aggregation through December 31, 2011. Residential end-use customers receiving generation service through such an aggregation who do not want to participate in the waiver program may request that Duke Energy Ohio bill them monthly for the rider.
- Non-residential customers who agree not to return to the SSO for the remainder of the three-year term of the proposed ESP period avoid the SRT. If such customers desire to return to ESP-SSO service, they agree to return at 115% of Duke Energy Ohio's ESP-SSO price, including the generation riders. Such non-residential customers shall also receive a generation price shopping credit equal to the SRA-CD rider. Non-residential customers who purchase competitive retail electric service from a competitive retail energy service (CRES) provider, but choose to pay the SRT rider, and waive the shopping credit may return to the ESP-SSO price at any time without notice.

Overall Audit Objectives and Scope

The overall objectives of the financial review of the SRT rider for 2011 were to:

- Determine that Duke Energy Ohio has procedures in place that are being followed to achieve control of costs associated with meeting the MBSSO load obligation plus a reserve margin, is processing capacity costs incurred to serve SRT customers, and is accurately calculating the SRT rate, including compliance with the financial procedural aspects of former *Chapter 4901:1—11 of the Administrative Code.* (Prior to June 2009, the reserve margin was 15% with installed capacity product (ICAP) MWs. Beginning in June 2009, the reserve margin requirement was set to 5.35% above the load obligation using unforced capacity product (UCAP) MWs.) (UCAP is ICAP adjusted for a three-year average historic forced outage rate.)

- Determine whether the Duke Energy Ohio SRT procedures are reasonable and being followed.
- Verify the arithmetic accuracy of allowable capacity costs passed through the SRT rate to Duke Energy Ohio's customers.
- Verify the arithmetic accuracy of the calculation and reporting of the SRT rate, including the difference between actual net revenues and actual net costs.
- Verify the proper SRT rates were applied in customer billings.
- Review the procedures and control for assembly and reporting of information in the SRT tariff billing sheets.
- Determine whether the company is following procedures for processing capacity data and whether those procedures are reasonable.
- Determine whether the company correctly reported payments made for capacity costs.
- Calculate the difference between actual net revenues and actual net capacity costs.

To address these objectives, Schumaker & Company performed the following activities:

- Interviewed personnel involved with accounting and filing relative to the SRT filings.
- Obtained and reviewed SRT quarterly filings with PUCO showing SRT tariffs by group and rate.
- Obtained and reviewed supporting work papers/documentation used by Duke Energy Ohio in developing these tariffs.
- Verified the arithmetic accuracy of Duke Energy Ohio's rate calculations and compared the resulting rates to PUCO filings.
- Traced the recovery of the revenues produced from the individual components of the SRT rates to the sales volumes included in Duke Energy Ohio's financial statements.
- Verified that actual revenues recovered from the SRT rates were reconciled against projected costs.
- Randomly selected customer bills from each quarter of the audit period (2011) to confirm that appropriate application of the SRT rate occurred in Duke Energy Ohio's customer billing system, as previously shown in *Exhibit IX-14*.

2011 Tariff Filing Data

Duke Energy Ohio made four quarterly SRT filings for 2011. *Exhibit IX-15* below illustrates the quarterly (1Q, 2Q, 3Q, and 4Q) SRT filing rates for the 2011 audit period.

Exhibit IX-15
SRT Tariff Filings
Four 2011 Quarters

Type of Tariff Charge			Q1 2011	Q2 2011	Q3 2011	Q4 2011
RS	Residential Service	All kWh	$0.000007	$0.000023	$0.000038	$0.000038
ORH	Optional Residential Service with Electric Space Heating	All kWh	$0.000007	$0.000023	$0.000038	$0.000038
TD	Optional Time-of-Day Rate	All kWh	$0.000007	$0.000023	$0.000038	$0.000038
CUR	Common Use Residential Serfice	All kWh	$0.000007	$0.000023	$0.000038	$0.000038
DS	Service at Secondary Distribution Voltage	First 1,000 kW	$0.108600	$0.195300	$0.209900	$0.209900
		Additional kW	$0.085900	$0.206500	$0.585540	$0.585540
		Billing Demand Times 300	$0.000248	$0.000448	$0.000480	$0.000480
		Additional kWh	$0.000075	$0.000136	$0.000144	$0.000144
GS-FL	Optional Unmetered for Small Fixed Loads	All kWh	$0.000757	$0.000663	$0.000648	$0.000648
EH	Optional Rate for Electric Space Heating	All kWh	$0.000553	$0.000982	$0.001620	$0.001620
DM	Secondary Distribution Service, Small	All kWh	$0.000919	$0.001461	$0.001510	$0.001510
DP	Service at Primary Distribution Voltage	First 1,000 kW	($0.045800)	$0.042600	$0.003940	$0.003940
		Additional kW	($0.036200)	$0.030700	$0.028800	$0.028800
		Billing Demand Times 300	($0.000118)	$0.000105	$0.000093	$0.000093
		Addition kWh	($0.000044)	$0.000040	$0.000040	$0.000040
TS	Service at Transmission Voltage	First 50,000 kVa	$0.065000	$0.288100	$0.288100	$0.288100
		Additional kVa	$0.065000	$0.288100	$0.288100	$0.288100
		Billing Demand Times 300	$0.000069	$0.000346	$0.000346	$0.000346
		Additional kWh	$0.000042	$0.000222	$0.000222	$0.000222
SL	Street Lighting	All kWh	$0.000748	$0.001131	$0.002638	$0.002638
TL	Traffic Lighting Service	All kWh	$0.000748	$0.001131	$0.002638	$0.002638
OL	Outdoor Lighting Service	All kWh	$0.000748	$0.001131	$0.002638	$0.002638
NSU	Street Lighting Service for Non-Standard Units	All kWh	$0.000748	$0.001131	$0.002638	$0.002638
NSP	Private Outdoor Lighting for Non-Standard Units	All kWh	$0.000748	$0.001131	$0.002638	$0.002638
SC	Street Lighting Service-Customer Owned	All kWh	$0.000748	$0.001131	$0.002638	$0.002638
SE	Street Lighting Service-Overhead Equivalent	All kWh	$0.000748	$0.001131	$0.002638	$0.002638
UOLS	Unmetered Outdoor Lighting Electric Service	All kWh	$0.000748	$0.001131	$0.002638	$0.002638

Source: Information Responses 197 and 249

For each of the individual rates included in *Exhibit IX-15,* Duke Energy Ohio performed the following calculations:

1. Estimates of 2011 capacity costs by rate group to be collected through SRT rates in 2011
2. Prior period SRT over/under collections by rate group to be collected from customers through SRT rates in 2011
3. Estimates of 2011 SRT billings by rate group
4. Item #1 plus Item #2 minus Item #3 as the total of Duke Energy Ohio's 2011 estimate of net capacity costs by rate group
5. Allocated Item #4 to individual rates and then divided by either estimated billing kW demands (first 1,000 kW and additional kW for DS, DP, and TS rates) or estimated kWh sales for 2011 (all other rates) to calculate the individual SRT rates

Exhibit IX-16 below illustrates the summary totals for these items used in Duke Energy Ohio's supporting documentation to its SRT tariff filings.

Exhibit IX-16
2011 Summary Estimates for SRT Filings by Quarter

[redacted]

Source: Information Responses 197 and 249

With each quarterly filing, Duke Energy Ohio updates its estimated costs and billing based on actual results experienced on a year-to-date basis. For example, with its first quarter 2011 filing, its project data is based solely on estimated data. However, for its second quarter 2011 filing, Duke Energy Ohio has two months of actual data and 10 months of projected data. Then for its third quarter 2011 filing, Duke Energy Ohio has five months of actual data and seven months of project data.

Findings and Conclusions

Finding IX-4 **Schumaker & Company's review of the methodology, calculations, and accounting entries concerning the quarterly filing of the SRT rate disclosed no discrepancies that affected the FPP rate for 2011.**

Schumaker & Company reviewed and recalculated, where appropriate, the work papers, supporting documentation, and accounting entries used to develop, report, and file the SRT rate included in PUCO filings. The mathematical accuracy of calculations was verified, entries were traced to supporting documentation, and rates were recomputed. Also, a random sample of customer bills, as shown previously in *Exhibit IX-14*, was examined to verify that the appropriate SRT rate was included on each invoice. Revenues and electricity usage were traced to monthly and annual financial reports used for external and internal purposes. A few minor formatting discrepancies were discovered, but they did not affect Duke Energy Ohio's accounting and reporting concerning the SRT rate for 2011.

Recommendations

None

X. Prior Audit Follow-Up

A. Background

Schumaker & Company was awarded a contract on January 7, 2010 by the Public Utilities Commission of Ohio (PUCO) to conduct an audit of Duke Energy Ohio's Riders PTC-FPP and SRA-SRT for the period spanning January 1, 2010 through December 31, 2010. *Exhibit X-1* gives the cover sheet from the PUCO copy of the Schumaker & Company 2010 report that was filed on May 12, 2011.

Exhibit X-1
Schumaker & Company 2010 Audit Report Cover
as of May 12, 2011

172

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Schumaker & Company

Management/Performance and Financial Audit
of the Fuel and Purchased Power and
System Reliability Tracker Riders of
Duke Energy Ohio, Inc.

For the

Public Utilities Commission of Ohio

Case No.10-974-EL-FAC

Case No. 10-975-EL-RDR

Redacted

May 2011

This is to certify that the images appearing are an accurate and complete reproduction of a case file document delivered in the regular course of business
Technician ______ Date Processed MAY 12 2011

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A stipulation agreement between all parties was signed on August 24, 2011 concerning eight (8) items within the audit report. This chapter reviews the status of each of the eight stipulation items.

B. Findings and Conclusions

Stipulation (II) (a) (i) – Refine processes to monitor work order performance

"Duke will use its existing eMax reports and refine processes to monitor work order performance (actual vs. estimated hours) and schedule attainment (actual vs. scheduled work completed). The auditor for the 2011 audit report will review and report on the adequacy of Duke's implementation of this requirement. (Jt. Ex. 1 at 5.)"

Finding X-1 Duke Energy Ohio uses eMax and PaSta reports to monitor work order and schedule attainment performance.

Exhibit IV-15, *Exhibit IV-16*, and *Exhibit IV-17* gives examples of reports used to monitor work order and schedule attainment during weekly staff meeting at each generating plant.

Exhibit X-2
Scorecard
as of December 31, 2011

"The scorecard is a tool used for measuring, trending, and providing corrective measures to the health of the work management systems."

Non-Reg Scorecard November, 2011

Crew	Schedule Compliance		Estimate vs. Actual		Emergent Work		PM Compliance	
Duke-A	81%	84%	1.16	0.43	13%	8%	90%	90%
Duke-C	80%	85%	0.47	0.23	14%	14%	100%	100%
Duke-FGD		N/A		0.49		N/A		N/A
Duke Total	**81%**	**85%**	**0.82**	**0.38**	**13%**	**11%**	**95%**	**95%**
C&K		N/A		0.04		N/A		N/A
Veolia	35%		0.82		0%		25%	
Solid	78%	N/A	1.55	N/A	4%	N/A	N/A	N/A
Sunbelt	25%	N/A	N/A	0.52	0%	N/A	N/A	N/A
Zachry	75%	N/A	0.70	1.13	16%	N/A	100%	N/A
Contract Total	53%		1.02	0.57	5%		63%	
Total	62%	85%	0.94	0.48	8%	11%	79%	95%
Grand Total	68%		0.69		9%		84%	

Source: Information Response 298

Exhibit X-3
Weekly Work Order Completion Report
as of December 31, 2011

"The weekly report provides feedback to all station personnel for work orders completed during the previous week."

Today:
12/15/2011

Completed Work Orders
Dates 11/28/2011 to 12/4/2011

	Type	P1	P2	P3	P4	P51	P52	P53	P54	Grand Total
Parent WO's	CM	3	1	0	10	0	0	0	0	14
	PM	0	0	0	124	0	0	0	0	124
	Safety	0	0	0	0	0	0	0	0	0
	Other	0	0	0	1	0	0	0	0	1
	Total	3	1	0	135	0	0	0	0	139
Task WO's	CM	7	5	1	29	0	0	0	0	42
	PM	0	0	0	124	0	0	0	0	124
	Safety	0	0	0	24	0	0	0	0	24
	Other	0	0	0	0	0	0	0	0	0
	Total	7	5	1	177	0	0	0	0	190
Grand Total		10	6	1	312	0	0	0	0	329

Source: Information Response 298

Exhibit X-4
Forced Outage Scorecard
as of December 31, 2011

"The forced outage scorecard is a tool used for measuring, trending, and providing corrective outage management in order to maximize outage readiness and effectiveness."

SNO Outage Report Card Duke Energy

Station:
Unit: Comments
Forced Event: SNO Outage **Overall: 77% C**
Start Date: 7/6/11 3.54
End Date: 7/9/11 6.40 Rolling Average: 77% C
Duration (hrs) 97.6 4.1 Days

Preparation Grade 100% A

Technical Coordinator Rank	Priority	Planned		Compliance	Comments
A	100%	100%		100%	
B	100%	100%		100%	
C	100%	100%		100%	

	Planned Hrs	Act. Hrs	Result	Target	Compliance
Planning	415.0	477.0	0.87	.85 to 1.15	100%

Schedule Compliance Grade 67% D

	WO's	Comp WO's	Result	Target	Compliance	Comments
Scheduled	20	20	100%	100%	100%	
Break in's	15	15	100%	100%	100%	
Break-in %			43%	10%	0%	

Execution Grade 66% D

		Earned Hrs	Act. Hrs	Result	Target	Compliance	Comments
Productivity Factor		415.0	1031.5	0.40	1.0	40%	
Completion Target	7/9/11 21.00	89.1	97.8	(A))	100%	91%	

Source: Information Response 298

Stipulation (II) (b) (i) – Manage demurrage charges

"Duke will continue working on managing demurrage charges. Following up on the investigation of methods to lower demurrage charges report to the auditors for the 2010 audit report, Duke will report its continuing efforts to reduce demurrage charges in time for consideration in the 2011 audit. (Jt. Ex. 1 at 5-6.)"

Finding X-2 Duke Energy Ohio has implemented a number of processes to manage and control demurrage charges

Exhibit X-5 shows the total Duke Energy Ohio annual demurrage charges for 2009 - 2011. The 2011 charges were 53.2% less than 2010 charges and 34.5% less than 2009.

Exhibit X-5
YTD November Demurrage Charges
2009 - 2011

[redacted]

Source: Information Responses 80, 200, and 301

Demurrage charges occur because barges are not unloaded at generating station harbors in a timely manner. *Exhibit X-6* provides an example of the report that is used to monitor locations of coal barges supplying Duke Energy Ohio's generating stations.

Exhibit X-6
Metric Used to Monitor Coal Barges Loaded/En Route
as of December 31, 2011

Coal Barges Loaded/En Route

BECKJORD

	Current Location	Origin	# Barges	ETA	Barge Line
12/13	Bellaire Harbor	1 Marietta, 4 McElroy	5	12/16 PM	Ingram
	KRT Marmet	KRT Marmet - LS coal	1	12/16 PM	Ingram
	Superior Fleet	Shrewsbury	1	12/17 AM	Ingram
	Lee Synnott	Highland/Uniontown	15	12/17 PM	Ingram
	Shawneetown	Arclar	3	12/18 AM	Ingram

ZIMMER

	Current Location	Origin	# Barges	ETA	Barge Line
12/13	Barbara	2 McElroy, 7 ACS	9	12/13 PM	Crounse
	Debi Sharp	ACS	15	12/14 PM	Crounse
	Jincy	ACS	1	12/14 PM	Crounse
	Laura Tamble	2 Somerville, 6 WB	8	12/15 AM	Crounse
	Big Bend	Big Bend - CBS&C	1	12/16 PM	Crounse
	Sara Page	2 Somerville, 5 WB	7	12/17 AM	Crounse
	Mt. Vernon	Elk Creek	6	12/17 PM	Crounse
	ACS	ACS	15	12/17 PM	Crounse
	Sandy Drake	Oxford	1	12/17 PM	Crounse

MIAMI FORT 7 & 8

	Current Location	Origin	# Barges	ETA	Barge Line
12/13	Robert C. Loedding	Shoemaker	1	12/13 PM	Ingram
	Laura Tamble	WB	7	12/14 PM	Ingram
	William E. Porter	ACS	15	12/15 PM	Ingram
	Harry R. Jacobson	Elk Creek	4	12/15 PM	Ingram
	Bellaire Harbor	Shoemaker	1	12/16 PM	Ingram
	Sara Page	Somerville	3	12/16 PM	Ingram
	Ytown	WB	1	12/16 PM	Ingram
	Mt. Vernon Fleet	Elk Creek	3	12/17 AM	Ingram

Source: Information Response 299

The number of barges in the harbors at Beckjord, Zimmer, and Miami Fort are monitored using the metrics shown in *Exhibit X-7*, *Exhibit X-8*, and *Exhibit X-9*.

Exhibit X-7
Metric Used to Monitor Barge Count at the Beckjord Harbor
September - December, 2011

[redacted]

Source: Information Response 299

Exhibit X-8
Metric Used to Monitor Barge Count at the Zimmer Harbor
September - December, 2011

[redacted]

Source: Information Response 299

Exhibit X-9
Metric Used to Monitor Barge Count at the Miami Fort Harbor
September - December, 2011

[redacted]

Source: Information Response 299

Stipulation (II) (b) (ii) – Refine process control of coal pile inventories

"Duke will continue to refine process control of coal pile inventories. The auditor for the 2011 audit report will review and report on the adequacy of Duke's implementation of this requirement. (Jt. Ex. 1 at 6.)"

Finding X-3 **Duke Energy Ohio has implemented practices and metrics to control coal pile inventories.**

Exhibit X-10 shows the metric that Duke Energy Ohio uses to monitor coal piles by following a three (3) week coal pile management plan shown in *Exhibit X-11*.

Exhibit X-10
Coal Pile Inventories
September -December, 2011

[redacted]

Source: Information Response 299

Exhibit X-11
Three (3) Week Coal Pile Inventory Plans
as of December 31, 2011

[redacted]

Source: Information Response 299

Exhibit X-12, *Exhibit X-13*, and *Exhibit X-14* provides the metrics that are used by Duke Energy Ohio to monitor coal pile activity at Beckjord, Zimmer, and Miami Fort stations respectively.

Exhibit X-12
Metric Used to Monitor Beckjord Station Coal Pile Activity
September - December, 2011

[redacted]

Source: Information Response 299

Exhibit X-13
Metric Used to Monitor Zimmer Station Coal Pile Activity
September - December, 2011

[redacted]

Source: Information Response 299

Exhibit X-14
Metric Used to Monitor Miami Fort 7 & 8 Station Coal Pile Activity
September - December, 2011

[redacted]

Source: Information Response 299

Stipulation (II) (c) (i) – Plan for alternative energy requirements beyond 2011

"Duke will discuss its plan for meeting the alternative energy requirements beyond the 2011 timeframe in a meeting with the signatory parties to be conducted in Columbus in February, or such other time as agreed upon by all signatory parties. Duke's planning in connection with the filing of its long-term forecast report during 2012 shall be among the topics for the meeting. Duke shall assure that its technical experts regarding planning for alternative energy requirements are available for the meeting. (Jt. Ex. 1 at 6.)"

Finding X-4 Duke Energy Ohio is in the process of complying with "Stipulation (II) (c) (i) – Plan for alternative energy requirements beyond 2011".

Duke Energy Ohio is in the process of arranging a meeting to comply with the stipulation as shown in *Exhibit X-15*.

Exhibit X-15
Duke Energy Ohio Actions to Comply with Stipulation (II) (c) (i)
2006 to 2010
as of February 28, 2011

"Counsel for Duke Energy Ohio, Inc. has contacted counsel for the Office of the Ohio Consumers' Counsel to schedule a meeting for purposes of holding such a discussion. The Office of the Ohio Consumers' Counsel has not yet responded. It is anticipated that compliance with this provision will be accomplished consistent with the commitment."

Source: Information Response 316

Stipulation (II) (c) (i) – Renewable energy credits plan

"In connection with Duke's plans for meeting alternative energy portfolio requirements recently required by Ohio law, Duke will provide the auditors, for each year remaining in the previously approved electric security plan, with documents describing Duke's procurement policies and procedures for obtaining renewable energy credits (RECS). Such documents shall include, but not be limited to, requests for proposals and contracts related to RECS. The auditors for each of these remaining years will review and report upon the adequacy of Duke's policies and procedures related to the procurement of RECS."

Recommendation X-1 **As discussed on page 103 of this report, as part of this year's integrated resource plan, revise the plan for meeting the alternative energy requirements into the future based on the current ESP program. (Refer to Finding VII-1)**

The current Integrated Resource Plan provides an overall plan for meeting the Alternative energy requirements of Chapter 4901:1-40 of the Ohio Administrative Code. However, it needs to be updated for the current ESP going forward. It should also include a projection of the number of RECs required each year for the next several years. In that Duke Energy Ohio has experienced a significant amount of switching over the last three years, although the percentage requirements for each of the various renewable products is continuing to increase each year, Duke Energy Ohio's need to procure RECs may actually have remained level or decrease slightly.

Stipulation (II) (d) (i) – Refund of omitted $612,970 2010 vintage year emission allowance (EA) sales margins

"Duke shall credit $612,970 in 2010 vintage year EA sales margins back to its Rider PTC-FPP customers in the first quarter practicable following a Commission order that approves this stipulation. The credit shall occur in the September 2011 Rider PTC-FPP filing, if this stipulation is approved by September 1, 2011, or in a subsequent filing that provides for the credit to Rider PTC-FPP. Duke will also credit the sale of EAs performed on behalf of its native load customers for the remainder of the ESP period that terminates on December 31, 2011. The auditor for the 2011 audit report will review and report on Duke's compliance with this requirement. (Jt. Ex. 1at 6-7.)"

Finding X-5 Duke Energy Ohio has refunded the $612,970 of 2010 vintage year emission allowance (EA) sales margins to its customers.

The refund of $612,970 was included in the 4th quarter 2011 FPP rates in which Duke Energy Ohio refunded EA sales margin to customers per the stipulation in Case No. 10-974-EL-FAC by reducing the emission allowance component reconciliation for April 2011, May 2011, and June 2011 at the rate of $204,323.33 per month or $612,970 in total for the three months. This amount was included in Duke Energy Ohio's fourth quarter FPP filing on Page 3A (RA), Page 3B (RA), and Page 3C (RA), respectively, which rolls up to the *Page 3 Reconciliation Summary* page.

Stipulation (II) (d) (ii) – Develop a Rider PTC-FPP accounting and procedures manual

"Duke will complete work to develop an accounting and procedures manual governing the processes involved in filing for fuel or fuel-related charges. The manual shall be developed in time for review by the auditor for the 2011 audit report, and the auditor shall review and report on the adequacy of Duke's accounting and procedures manual for Rider PTC-FPP. (Jt. Ex 1 at 7.)

Finding X-6 **Duke Energy Ohio completed work on developing an accounting and procedures manual governing the processes involved in filing the FPP rider.**

Duke Energy Ohio developed *PTC-FPP Quarterly Filing Procedures* documentation, which was initially effective January 1, 2011, and subsequently updated December 13, 2011 (effective January 1, 2012), which meets the requirements of Schumaker & Company's recommendation in our 2010 audit report.

Stipulation (II) (d) (iii) – Procedure for verify customer bill information

"Duke will establish a procedure for verifying customer bill information when supplying it from Duke's billing system to outside auditors during testing procedures. The procedure will be used in supplying information to the auditor for the 2011 audit report, and the auditor will review and report on the adequacy of Duke's implementation of this requirement. (Jt. Ex. 1 at 7.)

Finding X-7 The sample bill testing process was easier to perform this audit cycle than in prior audit cycles due to the inclusion of a Excel bill calculator worksheet.

The procedure developed by Duke Energy Ohio is as follows:

> For each bill provided by the Company to outside auditors during testing procedures, the Company will also provide at the same time a completed electronic Excel spreadsheet that shows the detailed calculations for each bill. The Excel spreadsheet will be operational with intact formulas, and it will contain the billing determinants and rate calculations that comprise and tie-out with each bill being sampled.

Besides the inclusion of billing determinants and rate calculations in the Excel bill calculator worksheet, it provided a total and five sub-totals to verify against a customer's bill. Additionally, we requested and received a formula for delivery riders that we could use to verify against each bill.

The spreadsheets initially provided are the same as the ones used by Billing Operations to test bills on a daily basis. A random sample bill report is run for each billing cycle for each month. The report pulls one account for each rate code in the Customer Management System (CMS). There are 21 billing cycles in each month. Every bill on the report is checked by using an Excel bill calculator worksheet to recalculate the bill and check it to the actual bill amount. Per the bill sample reports requested by Schumaker & Company in our sampling of bills, there are approximately 150 Ohio electric bills per billing cycle tested and given there are 21 billing cycles each month, it means there are approximately 3,000 Ohio electric bills tested each month. The documentation supporting the testing performed by Duke Energy Ohio provided to Schumaker & Company consultants was a report listing the bills tested for each billing cycle in a sample month.

Stipulation (II) (d) (iv) – Develop a Rider SRA-SRT accounting and procedures manual

"Duke will complete work to develop an accounting and procedures manual governing the processes involved in supporting documentation for the existing Rider SRA-SRT. The manual will be completed according to the directive contained in the 2010 audit report. The manual shall be developed in time for review by the auditor for the 2011 audit report, and the auditor shall review and report on the adequacy of Duke's accounting and procedures manual for Rider SRA-SRT. (Jt. Ex. 1at 7.)"

Finding X-8 **Duke Energy Ohio completed work on developing an accounting and procedures manual governing the processes involved in filing the SRT rider.**

Duke Energy Ohio developed *SRA-SRT Quarterly Filing Procedures* documentation, which was initially effective January 1, 2011, and subsequently updated December 13, 2011 (effective January 1, 2012), which meets the requirements of Schumaker & Company's recommendation in our 2010 audit report.