

*Energy Demand/Consumption  
Ohio's 9<sup>th</sup> District*

Palmer Energy Company

September 2011

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# Executive Summary

This report was funded by an award to the Palmer Energy Company from Oberlin College through the Department of Energy (DOE)'s National Energy Technology Laboratory (NETL). This portion of the report focuses on the deliverables listed below between Oberlin College and the Palmer Energy Company as of September 2011.

## Deliverables

1. Provide numbers for electric demand (kW) and consumption (kWh/yr.) and natural gas consumption (Btu) in the 9<sup>th</sup> district inclusive of a projected growth rate.
2. Electric source breakdown (i.e. % of coal, wind, etc.) for the 9<sup>th</sup> district. Inclusive of source location.
3. Break down residential/commercial/industrial consumption to county levels.
4. Overview of 9<sup>th</sup> district which will be shown in September 16<sup>th</sup> presentation.
5. White paper on results of findings and presentations.

## Consumption vs. Demand

When speaking about electrical energy, there are two related, yet different, measurement parameters that need to be understood: consumption and demand.

Consumption is the total amount of energy used. Energy consumed is represented by *kilowatt hours* (kWh). Typically electric demand is not measured for residential customers.

Demand is the instantaneous rate of energy consumption. Historically, utilities measure the integrated or average demand over time. In the case of FirstEnergy's Ohio distribution utilities the demand is integrated over a 15 minute interval. The rate of consumption would be kilowatt hours per hour or just *kilowatts* (kW). However, commercial customers are charged for both the energy used and how fast they use it.

## Methodology

The communities of Ohio District 9 sampled for this report include all of Erie and Ottawa counties, the western portion of Lorain County and all but the southern and far western portions of Lucas County. Together these communities have approximately 238,466 residential and 32,033 commercial and industrial customers.

Electric information found in this report includes the number of residential, industrial and commercial customers, customers by classification, use of customers based upon classification, the estimated consumption of the largest 20 customers and information pertaining to natural gas consumption in similar categories.

Palmer Energy obtained this information through a number of sources listed below. A number of utility distribution providers also offered information. Much of this information can be obtained through various sources of public information but is not easily found. Palmer Energy's knowledge is partially derived from reviewing thousands of pages of information and filings in various FirstEnergy rate cases as an expert witness before the Public Utilities Commission of Ohio (PUCO). Likewise, Palmer Energy has thousands of customers that help provide context to the publically available information. Thus, the conclusions and observations derived from this information rely upon Palmer Energy experience in the industry.

Information and data collection for this report was taken from the following sources:

- NAICS Codes, Harris Index, On Line Sources, State of Ohio Dept. of Energy Grants listings and GEO Solar Tours - Provided leads from manufacturers, installers and suppliers about many PV and wind installations.
- FERC Form 1 Data, FERC website, PUCO Reports, American Municipal Power - Consumption and use data including customer counts.
- 2010 Census Data – Quantifying household customer accounts per county.
- FirstEnergy and Columbia Gas of Ohio Reports – Electric and Natural Gas long-term energy forecasting data.
- Misc. Public Resources – Useful for additional Columbia Gas Reports & forecasting.

More specifically, Palmer Energy utilized the per customer information from FERC Form 1 data, 2010 United States Census data and other publically available general information from governmental aggregation efforts in FirstEnergy utility service territory to determine the breakdown by county and the overall consumption by customer class.

Columbia Gas of Ohio provided a breakdown of the 9<sup>th</sup> Congressional District in Ohio of the residential, commercial and industrial consumption. This information was then broken down by County using the same 2010 US Census data to determine the ratio of households and commercial consumers in each County in the 9<sup>th</sup> Congressional District.

### **General Observations**

Like any creation of artificial lines Ohio's 9<sup>th</sup> Congressional District has boundaries where various significant energy consumers or generation capacity fall just outside the lines that were drawn. Large industrial consumers such as Johns Manville in Waterville, Rexam Canning in Whitehouse, Pilkington NA in Rossford, Walbridge Coatings in Walbridge, and the steel plant in Delta would have been significant enough to impact the overall use but would not have changed Palmer Energy's overall observations.

When the geography of the 9<sup>th</sup> District is overlaid with various electric generation facilities a number of notable generation facilities fall just outside the District as well. These facilities include the 707 megawatt natural gas fired Fremont Energy Center that is currently being completed, 555 megawatt natural gas and fuel oil fired West Lorain generating facility and the 688 megawatt natural gas fired Troy Energy plant. While Palmer Energy doesn't know the exact operational status of these facilities, the total generation capacity of these three facilities exceeds the generation capacity located inside the 9<sup>th</sup>. Such facilities have an impact on the generation source in the District.

While there are a number of large energy consumers and generators immediately beyond Ohio's 9<sup>th</sup> Congressional District there are also a significant number of large energy consumers inside the district. These consumers can be named by virtually anyone knowledgeable about industry in North Central and Northwest Ohio. Such large energy consumers and large employers such as BP-Husky, the former Sun Refinery, Chrysler Toledo North Assembly Plant, and Materion (formerly Brush-Wellman) are examples of very large energy consumers that significantly impact energy consumption. These facilities are such substantial energy consumers that even a small percentage change in consumption represents millions or even tens of millions of kWh. This potential for conservation, job growth and productivity enhancement should not be ignored in these largest consumers since they represent such a large percentage of the overall energy consumption and economic vitality in the district.

Such large industrial consumers are not the only large energy consumers in the district. The ongoing increase in the regions' governmental and healthcare industries also represents some of the larger consumers in the 9<sup>th</sup> Congressional District. The City of Toledo, University of Toledo, Toledo Hospital and St. Vincent-Mercy Medical Center are all large energy consumers as well. While these facilities do not consume nearly as much energy as their industrial counterparts, none the less, they represent very significant conservation opportunities for conservation since they have no industrial process requirements.

Like the largest consumers generation in the 9<sup>th</sup> Congressional District is also generally derived from two major generation facilities...FirstEnergy's Davis-Besse nuclear facility and their coal/petroleum coke fired Bayshore plants. Individually, the total annual kWh output of Davis-Besse exceeds the consumption of every consumer in the 9<sup>th</sup>. While the electric consumption in the District is clearly derived from sources other than Davis-Besse, there is little doubt that a large percentage of the electric needs in the District are met with the output of this plant.

# Summary of Findings

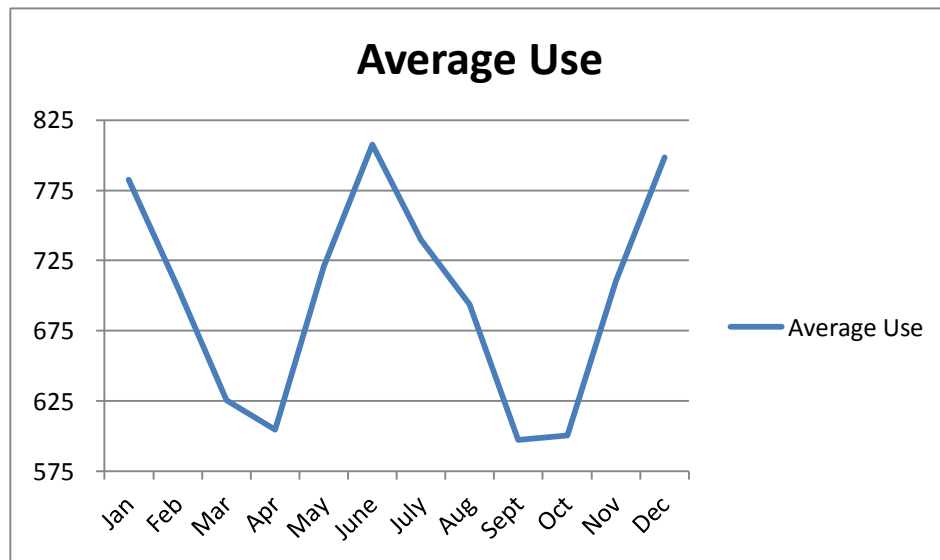
**Deliverable - Provide numbers by end use for electric demand (kW), consumption (kWh/yr.) and natural gas consumption (Btu) in the 9<sup>th</sup> district inclusive of a projected growth rate.**

## Electricity Consumption

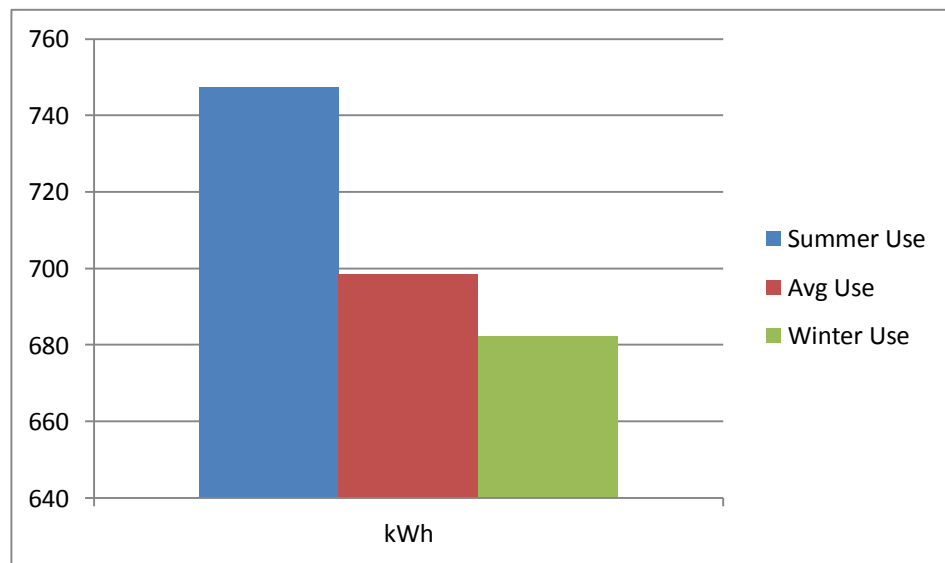
### Residential Customers

The communities included in the study have a total of 238,466 residential customers. On average residential consumers in the 9<sup>th</sup> Congressional District consume 699 kWh of electricity per month (682 kWh in the winter months and 747 kWh during summer months). The table and charts below show the variation in residential average monthly consumption. Total annual residential use in the 9<sup>th</sup> Congressional District is 1.99 billion kWh.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
<b>AVERAGE USE</b>	782	705	625	604	720	808	740	694	597	600	710	798	8,383



The chart below shows the comparison between the overall average use, average summer use and average winter use of a residential customer.



*\*Winter Average (September-May) 682 kWh*

*Summer Average (June-August) 747 kWh*

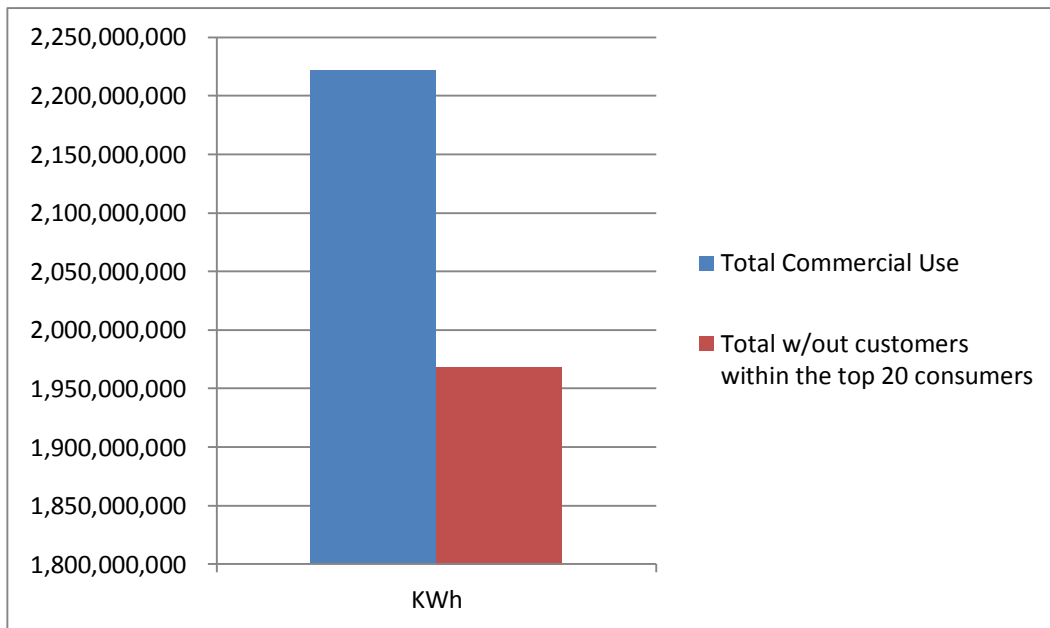
*Overall Average 699 kWh*

The chart immediately above clearly points out the impact air conditioning has on residential consumption in Northern Ohio. However, it is also interesting to note in the average monthly use chart that consumption during the peak winter months is nearly identical to the use in the peak summer months. This effect is driven by two different factors. First, natural gas heated homes electric use increase during the colder winter months because either their furnace fans are running (in the case of forced air heating) or their pumps running (in the case of hot water heating). This increases the use for natural gas heated homes heated relative to the warmer spring and autumn months when neither air conditioning nor heating are running consistently. Second and more significant is the impact of electrically heated homes on the consumption pattern. Palmer Energy estimates there are between 20,000 and 30,000 electrically heated apartments and homes in the 9<sup>th</sup> Congressional District. This 8% to 10% of consumers dramatically increase their use during these months and increase the average monthly consumption in the peak winter months.

**Commercial Customers**

<b>Number of Customers</b>	<b>Total Use (kWh)</b>	<b>Average Use (kWh)</b>
31,825	2,221,705,000	69,810

The chart below shows the estimated use of all commercial customers in District 9. It also shows the estimated remaining consumption after commercial customers within the top 20 of overall largest consumers have been removed from the data.



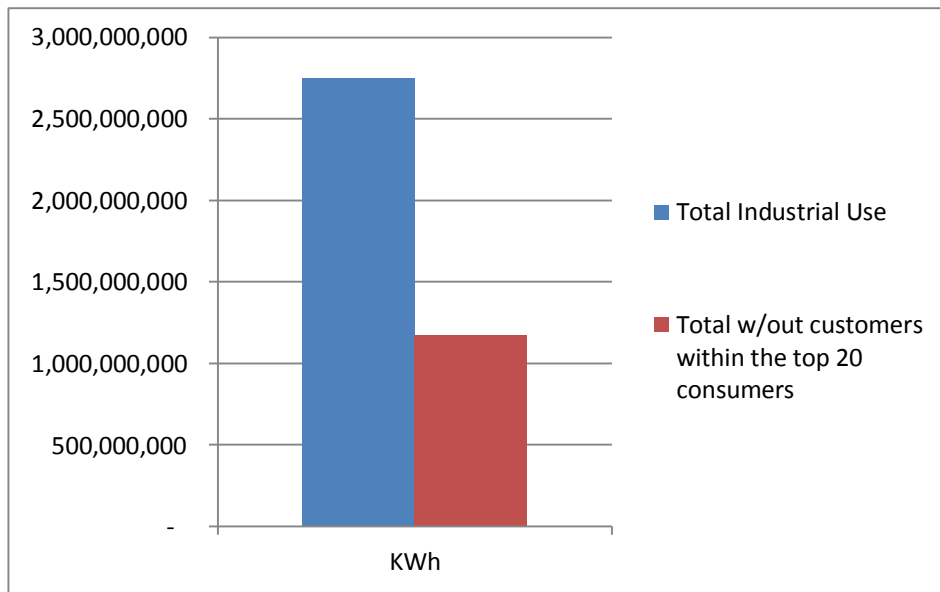
The impact of largest commercial consumers (healthcare, government & university) clearly has a significant impact on the overall commercial electricity consumption. These types of facilities offer substantial opportunities to reduce consumption as lighting efficacy increases. This is particularly true for governmental and university operations since Ohio Law permits them to float debt that is not counted against their total debt limitations to pay for their energy conservation efforts.



**Industrial Customers**

<b>Number of Customers</b>	<b>Total Use (kWh)</b>	<b>Average Use (kWh)</b>
208	2,750,887,000	13,225,000

The chart below shows the estimated consumption of industrial customers within District 9. It also shows the total consumption after industrial customers within the top 20 of overall consumers have been removed from the data.



While the largest industrial consumers represent a significant portion of the industrial consumption in the 9<sup>th</sup> District, the proportion of the overall use in the market segment is even higher than in the commercial segment. However, it is important to note that even after eliminating these largest consumers, the remaining 195 or so industrial consumers' collective use still represents 60% of the collective use of every residential consumer in the District.

Industrial consumers clearly represent a significant portion of the overall electricity consumption in the 9<sup>th</sup> Congressional District. Despite this fact securing ongoing reductions in that consumption may be limited in the industrial community. During numerous conversations with industrial energy consumers over the years, Palmer Energy has generally encountered a number of impediments to the implementation of energy conservation projects. First, large manufacturing generally requires significant investments to secure significant reductions in energy consumption. Such investments in what is generally considered a "non-core" investment are difficult to gain approval in these challenging economic times. In fact many industrial consumers require a simple return in less than two

years unless it is directly related to their core business. Second, any significant change in an industrial consumers' energy consumption often requires modification of the manufacturing processes at the facility. This introduces concerns of quality degradation. Since potential quality degradation has significant ramifications on the business, such concerns can stop an energy efficiency project in its tracks unless senior management in that company maintains a focus on this effort.

## Electricity Demand & Projected Growth Rates

### Overall Demand

The overall demand is projected in the table below using historic load factors to estimate the non-coincident peak demand for the various consumers in the District.

Overall Demand

	RESIDENTIAL (MW)	COMMERCIAL (MW)	INDUSTRIAL (MW)
LUCAS	409	428	337
ERIE	90	73	47
OTTAWA	50	41	27
LORAIN	90	78	48

The Annual internal peak demand for Toledo Edison is expected to grow at an average annual rate of 0.50% in FirstEnergy 2011 Load Forecast filed at the PUCO. The Annual internal peak demand for Ohio Edison Company is expected to grow at an average annual rate of 0.53% in FirstEnergy 2011 Load Forecast filed at the PUCO.

Nothing in any material or general knowledge would indicate that the long term forecasts of demand increases by FirstEnergy are not representative of the 9<sup>th</sup> Congressional District as a whole. Since the majority of load in the District receives its distribution service from Toledo Edison, the average increase in peak demand in the 9<sup>th</sup> Congressional District's is estimated to increase at 0.5% annually.

### Overall Electric Consumption Growth

The projected change in consumption inside the 9<sup>th</sup> Congressional District is being estimated using the FirstEnergy's 2011 long term energy forecast. While there are municipal utilities in the district and a small number of consumers served by rural electric cooperatives the load growth projections of FirstEnergy should be representative of the District as a whole.

### Residential/Commercial/Industrial (The Toledo Edison Company)

The planning objective of the Long-Term Forecast Report for both the Toledo Edison and Ohio Edison companies takes into account local and national business conditions, as well as historical consumption patterns and future efficiency and peak demand reduction savings.

YEAR	RES.	COM.	IND.	OTHER	TOTAL END USER DELIVERY	LOSSES & UNACCOUNTED FOR COMPANY	NEW ENERGY FOR LOAD
2011	2,497,000	2,547,000	5,185,000	58,000	10,284,000	580,000	10,867,000
2012	2,468,000	2,742,000	5,308,000	52,000	10,570,000	598,000	11,168,000
2013	5,730,000	2,744,000	5,636,000	48,000	10,858,000	609,000	11,467,000
2014	2,367,000	2,751,000	5,807,000	48,000	10,973,000	604,000	11,577,000
2015	2,300,000	2,770,000	5,867,000	48,000	10,985,000	609,000	11,585,000
2016	2,228,000	2,792,000	5,933,000	48,000	11,001,000	592,000	11,593,000
2017	2,163,000	2,783,000	6,019,000	48,000	11,013,000	588,000	11,601,000
2018	2,095,000	2,790,000	6,135,000	48,000	11,068,000	585,000	11,653,000
2019	1,938,000	2,786,000	6,182,000	48,000	10,954,000	568,000	11,522,000
2020	1,779,000	2,784,000	6,243,000	36,000	10,842,000	567,000	11,409,000
2021	1,629,000	2,786,000	6,312,000	36,000	10,763,000	548,000	11,311,000

The 2011 Energy Forecast projects that total energy for Toledo Edison will reach 10,867 GWh by 2011 and 11,311 GWh by 2021, resulting in an effective growth rate of 0.40%. However, you will note that the growth projections are not consistent across the various market segments. FirstEnergy is projecting the consumption for residential consumers to actually decline over the next 10 years. The factors that drive that change are changes in lighting

standards, ongoing changes in federal efficiency standards for residential appliances and the impact of the State of Ohio's energy efficiency benchmarks found in SB221.

**Residential/Commercial/Industrial  
(The Ohio Edison Company)**

YEAR	RES.	COM.	IND.	OTHER	TOTAL END USER DELIVERY	LOSSES & UNACCOUNTED FOR COMPANY	NEW ENERGY FOR LOAD
2011	9,198,000	6,673,000	8,013,000	143,000	24,27,000	170,300	25,730,000
2012	8,924,000	9,762,000	8,243,000	138,000	24,067,000	176,600	25,833,000
2013	8,835,000	6,939,000	8,767,000	137,000	24,678,000	177,800	26,456,000
2014	8,739,000	7,101,000	9,149,000	136,000	25,125,000	179,200	26,917,000
2015	8,671,000	7,187,000	9,055,000	135,000	25,048,000	177,300	26,821,000
2016	8,638,000	7,203,000	8,907,000	134,000	24,882,000	174,100	26,623,000
2017	8,566,000	7,214,000	8,858,000	133,000	24,770,000	170,400	26,474,000
2018	8,552,000	7,222,000	8,843,000	131,000	24,748,000	167,000	26,418,000
2019	8,373,000	7,215,000	8,768,000	130,000	24,488,000	159,000	26,076,000
2020	8,198,000	7,205,000	8,756,000	128,000	24,287,000	150,100	25,788,000
2021	8,039,000	7,191,000	8,719,000	124,000	24,073,000	139,000	25,463,000

The 2011 FirstEnergy long term energy forecast projects that total energy distribution for Ohio Edison will be 25,730 GWh in 2011 but actually decline to 25,463 GWh by 2021, resulting in an effective growth rate of -0.10%. Like the Toledo Edison forecast, residential consumption is anticipated to drop due to changes in lighting standards, ongoing changes in federal efficiency standards for residential appliances and the impact of the State of Ohio's energy efficiency benchmarks found in SB221. However, unlike Toledo Edison the projected increase in load in the commercial and industrial market segments is insufficient to completely replace the drop in residential consumption.

Natural Gas Consumption

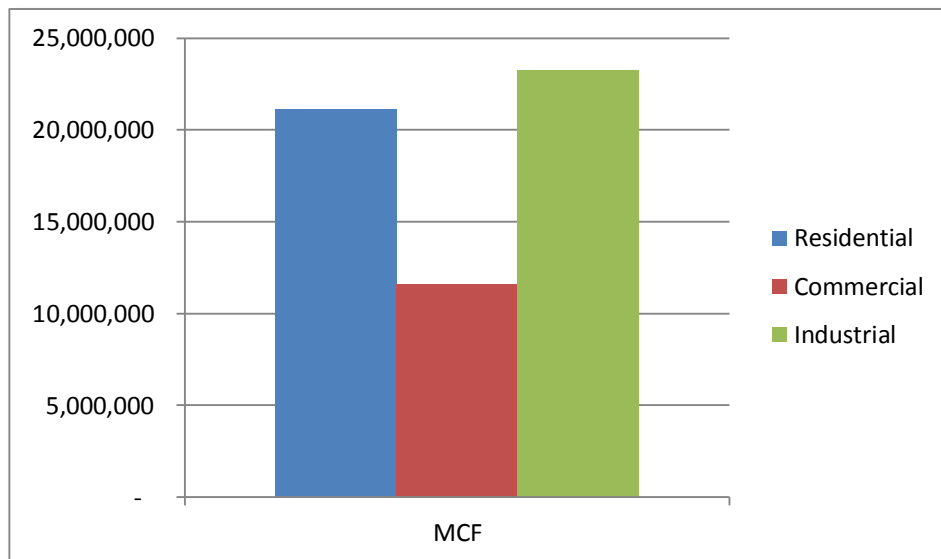
Columbia Gas is the primary natural gas service provider within the 9<sup>th</sup> District.

**Residential/Commercial/Industrial**

The table below compares the number of natural gas customers by classification and their consumption. To calculate the total use in millions of Btu's the analysis assumes an average Btu content of 1.02 MMBtu per thousand cubic feet (e.g. Mcf).

	# OF CUSTOMERS	AVERAGE USE OF MCF	TOTAL USE OF MCF	TOTAL USE OF MMBTU
<b>Residential</b>	210,593	100	21,059,300	21,480,000
<b>Commercial</b>	17,565	658	11,558,000	11,789,000
<b>Industrial</b>	200	116,098	23,220,000	23,684,000

The chart below illustrates the comparison of overall Natural Gas consumption.



Natural Gas Demand - Projected Growth Rates**Residential/Commercial/Industrial**

The table below shows the COH (Columbia Gas of Ohio) 10-Year Demand Forecast. Base Case is in billions of cubic feet (Bcf).

<b>YEAR</b>	<b>RESIDENTIAL</b>	<b>COMMERCIAL</b>	<b>INDUSTRIAL</b>	<b>TOTAL</b>
<b>2007</b>	111.4	67.1	86.4	264.9
<b>2008</b>	110.3	66.9	90.5	267.7
<b>2009</b>	110.0	67.4	91.7	269.1
<b>2010</b>	110.5	67.2	92.7	270.4
<b>2011</b>	110.6	67.4	93.8	271.7
<b>2012</b>	110.6	67.5	94.9	273.1
<b>2013</b>	110.5	67.7	96.7	275.0
<b>2014</b>	110.5	67.9	98.5	276.9
<b>2015</b>	110.5	68.2	99.5	278.3
<b>2016</b>	110.6	68.6	100.3	279.5
<b>2017</b>	110.7	68.9	100.9	280.5
<b>CAGR</b>	<b>-0.07%</b>	<b>0.26%</b>	<b>1.57%</b>	<b>0.57%</b>

\* CAGR: Compound annual Growth Rate

It is important to note that residential natural gas consumption, like electricity, is anticipated to decline over time. This is caused by ongoing conservation efforts and the impact of federal minimum efficiency standards for various natural gas fired appliances (e.g. furnaces and AWH). Only industrial energy use is anticipated to increase over time by Columbia Gas of Ohio. While this information represents all of Columbia's territory over the state, Palmer Energy sees no significant deviation from this trend in the 9<sup>th</sup> District relative to the remainder of Columbia of Ohio's service territory.

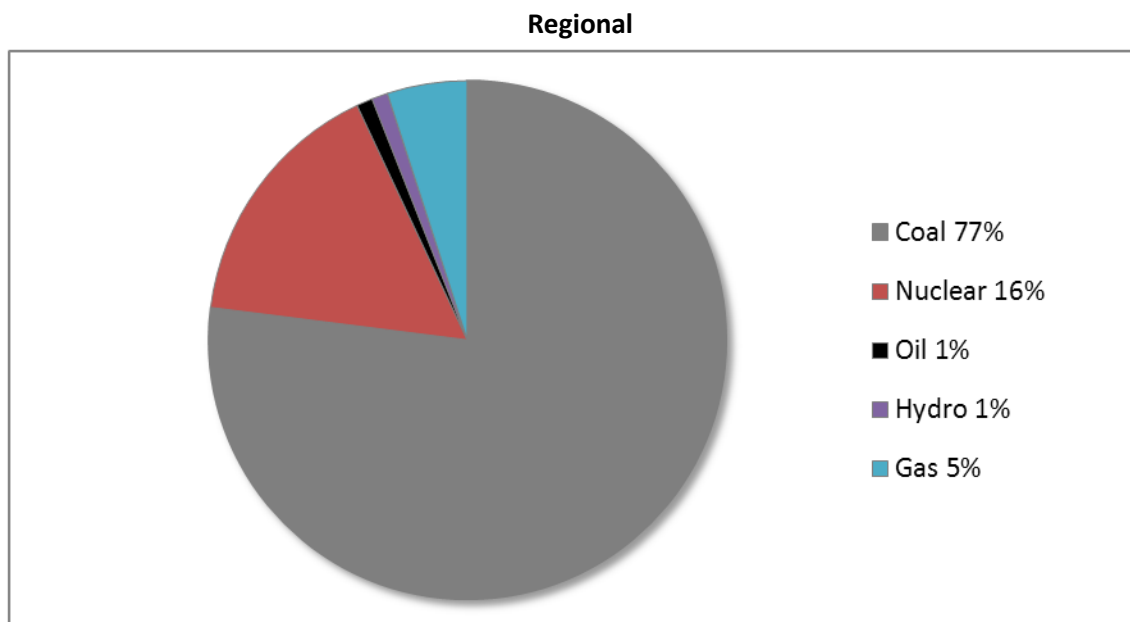
**Deliverable - Electric source breakdown (i.e. % of coal, wind, etc.) for the 9<sup>th</sup> district. Inclusive of source location.**

Palmer Energy has included four different pie charts for informational purposes showing the projected breakdown of various energy sources. The reason for three of the pie charts is to show different ways of looking at this deliverable. No breakdown can be absolutely accurate since electricity flows via the path of least resistance. There is substantial energy generation that is being imported into and exported from the Congressional District constantly based upon localized supply and demand and the operation of the PJM regional transmission grid.

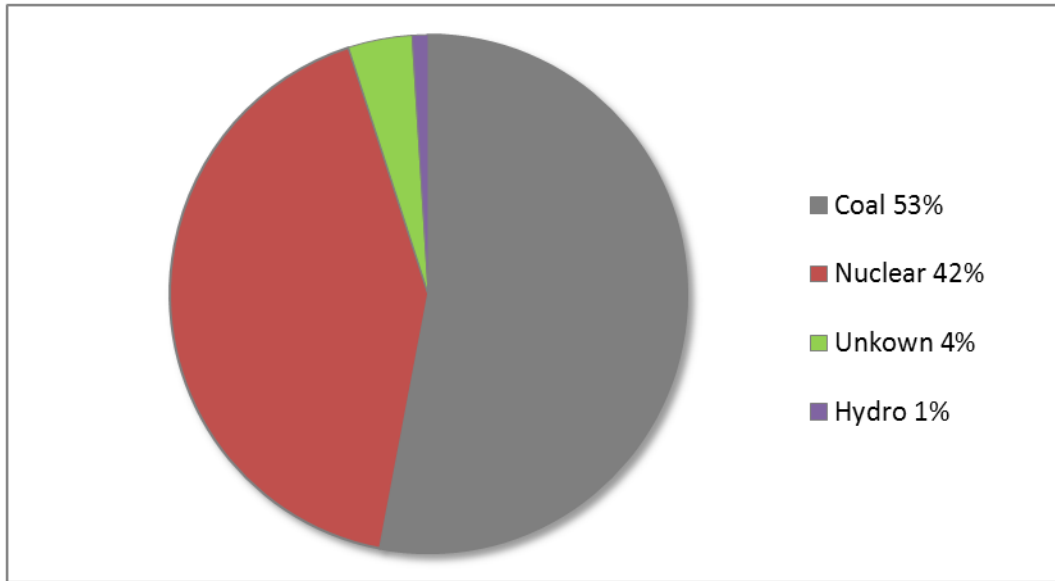
The first of the pie charts shows the projection generation source in the region (e.g. Ohio, Michigan, Indiana, Western PA, and Kentucky). The second pie chart shows the breakdown of generation for FirstEnergy Solutions. The generation portfolio of FirstEnergy's affiliate FirstEnergy Solutions is likely the most accurate representation of consumption in the 9<sup>th</sup> District. FirstEnergy Solutions is the third party sales arm of FirstEnergy and supplies the vast majority of the 9<sup>th</sup> District's consumers through various energy sales contracts, governmental aggregations, and utility supply secured through a PUCO administered auction process. The third pie chart is Palmer Energy estimate of what the breakdown would be if the 9<sup>th</sup> Congressional District were an island and all consumption and generation was consumed inside the District.

The final pie chart attempts to represent the generation of the nascent but growing segment of wind and solar generation in the 9<sup>th</sup> Congressional District.

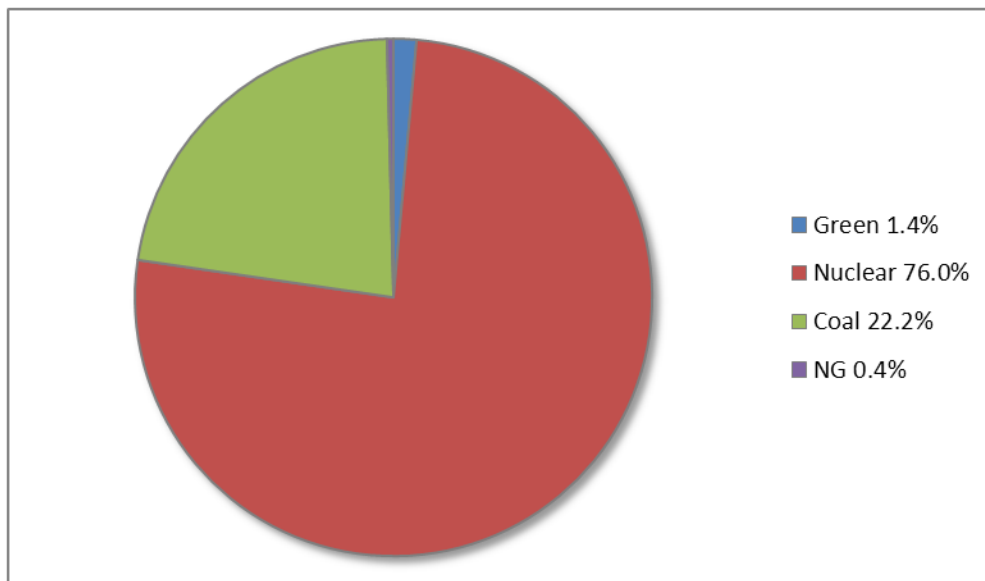
A complete listing of the generation facilities, locations, and rated output in District 9 can be found in table format in Appendix A.



**FirstEnergy Solutions**



**District 9**

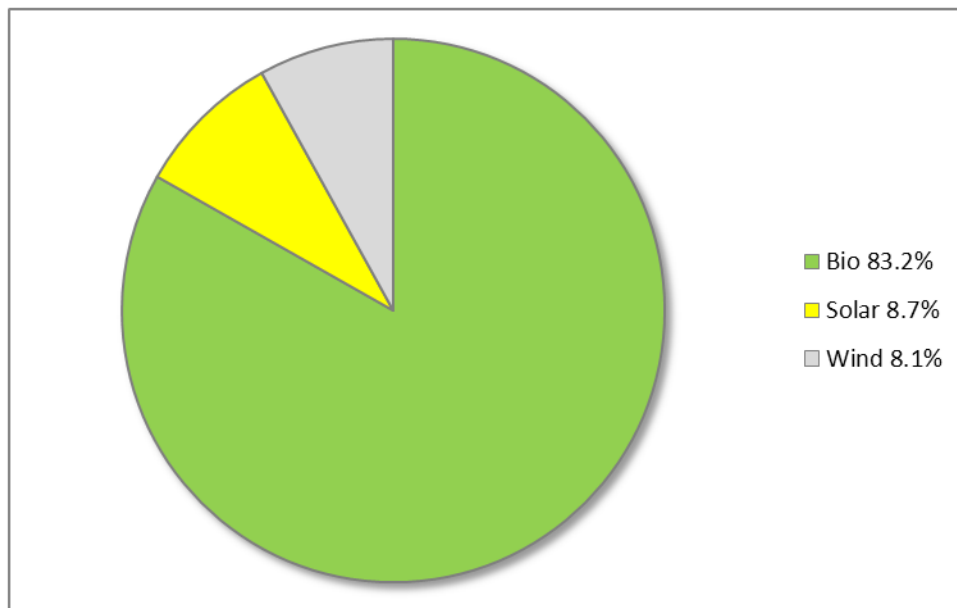


The chart above provides a context of what electricity generation in the 9<sup>th</sup> Congressional district would be if the District were an island. It is projected using the estimated generation of all other energy sources in the District other than nuclear. The remaining consumption is then considered nuclear.



It is interesting to note that the while the peak demand of the District requires other sources of supply, the entire annualized electricity consumption of the 9<sup>th</sup> could be supplied by FirstEnergy's Davis-Besse nuclear plant when it is operating. However, as discussed previously electricity flows via the path of least resistance. Thus a substantial portion of Davis-Besse's generation capacity is exported outside the District while other electricity is imported into the District.

**District 9  
(Renewable Energy only)**



This generation of nearly 100 million kWh of renewable energy sources (e.g. bio-fuel, solar or wind) represents 1.4% of the total consumption of the 9<sup>th</sup> District. As SB221 continues, this percentage will increase.

**Deliverable - Break down residential / commercial / industrial consumption at county levels.**

## Electric Consumption Per County

The table below shows the total number of residential/commercial/industrial customers in District 9 and their respective **use** per county.

	Residential Customers	Residential Use(kWh)	Commercial Customers	Commercial Use(kWh)	Industrial Customers	Industrial Use(kWh)	Total Use
<b>Erie</b>	31,755	266,202,000	4,230	265,197,000	34	283,452,000	814,851,000
<b>Lorain</b>	32,047	268,650,000	4,270	267,705,000	34	283,452,000	819,807,000
<b>Lucas</b>	156,803	1,314,480,000	20,945	1,539,591,000	120	2,017,246,000	4,871,317,000
<b>Ottawa</b>	17,861	149,729,000	2,380	149,212,000	20	166,737,000	465,678,000
<b>Total</b>	238,466	1,999,061,000	31,825	2,221,705,000	208	2,750,887,000	6,971,653,000

## Natural Gas consumption per county

### Residential/Commercial/Industrial

	Residential Customers	Use MMBtu	Commercial Customers	Use MMBtu	Industrial Customers	Use MMBtu
<b>Erie</b>	28,043	2,860,000	2,335	1,567,000	33	3,908,000
<b>Lorain</b>	28,301	2,887,000	2,357	1,582,000	33	3,908,000
<b>Lucas</b>	138,476	14,125,000	11,559	7,758,000	115	13,618,000
<b>Ottawa</b>	15,773	1,609,000	1,314	882,000	19	2,250,000
<b>Total</b>	210,593	21,481,000	17,565	11,789,000	200	23,684,000

The use projected in millions of Btu presumes an average Btu content of 1.02 MMBtu per Mcf.

**Deliverable – Mr. Mark Frye will present an overview of this information for the 9th District at Oberlin College on Sep. 16<sup>th</sup> 2011.**

## Conclusions

The information in this report shows a number of interesting items and key trends to consider. First, there is clearly the impact of large numbers when considering the energy consumption of the 9<sup>th</sup> Congressional district. Large industrial consumers represent a very substantial portion of the total energy consumption but represent only a tiny percentage in the overall customer counts. While this certainly isn't surprising to many considering the manufacturing heritage of Northern Ohio, the fact that it still remains such a large influence on the overall District energy consumption may be a surprise to many. An effective conservation effort must recognize and address the impact industrial participation has in energy conservation efforts.

Second, there appears to be a very clear and ongoing trend towards reduced energy consumption (both natural gas and electricity) for residential consumers. Both major utilities in the 9<sup>th</sup> Congressional District anticipate declining energy residential consumption over the next few years. This is caused by a number of coincident factors such as federal appliance energy efficiency standards, increased lighting efficiency standards, and State regulations regarding increased efficiency.

Third, while there are numerous solar and wind installations in the 9<sup>th</sup> Congressional District and many more in the planning stages, the vast majority of electric energy consumption is still supplied by nuclear power (e.g. Davis-Besse). In fact, if the entire district was on an island, the total kWh use of the 9<sup>th</sup> District could be supplied by that one plant. The outcome of FirstEnergy's requested extension of the operating license at that plant currently pending before the Nuclear Regulatory Commission will have a dramatic impact on the 9<sup>th</sup> District's generation potential.

Fourth, there are large natural gas fired generation resources that are located just outside the 9<sup>th</sup> District. If electricity consumption increases over time as it has historically done over the past 100 years, these facilities and others yet to be constructed will have a very significant impact on the generation consumed within the 9<sup>th</sup> District. Likewise if Davis-Besse's operating license extension request is denied, these facilities and other yet to be constructed will have a large impact on the District generation mix.

Fifth, the growing trend to install small distributed solar and wind generation will likely continue on pace as long as the federal and state incentives and mandates remain. As the number of these facilities increases their variability in operations may begin to impact electric distribution and transmission assets. They may also begin to impact the dispatch of various generation assets.

Sixth, if the trend of conservation and increased solar and wind generation continues, reduction in the 9<sup>th</sup> District' generation assets is likely. This is apparent in the partial shutdown of the Bayshore facility in Oregon where only one of four generators is currently operating during most of the year.

All work contained within this report was compiled in August and September of 2011. If you have further questions, contact:

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## Appendix A:

# Bio Fuels, Coal, Micro Turbines, Natural Gas, Nuclear, Solar PV, Solar thermal, Wind & Wind/Solar combination Installations – 9<sup>th</sup> District

### Sources:

NAICS Codes, Harris Index, On Line Sources, GEO Solar Tours, FERC Form 1 Data, PUCO Report, Amp Ohio Data, Columbia Gas Reports, State of Ohio Dept. of Energy Grants and Misc. Public Resources

Renewable Generating Facility Name 2005-2011	County	Renewable Resource Technology	Generating Capacity	Capacity Label	Facility Location
City of Sandusky	Erie	Solar PV	18.70	kW	
David Miller	Erie	Solar PV	4.70	kW	13706 McIntyre Rd, Milan OH 44846
Erie County Sanitary Landfill	Erie	Bio Fuels	1,600.00	kW	10102 Hoover Rd - Milan, OH 44846
P.P.I. Properties LLC	Erie	Solar PV	11.20	kW	3414 St. Rt. #113 East, Milan OH 44846
Alto Miller	Erie	Solar PV	3.00	kW	
Bill McCauley	Erie	Wind	2.40	kW	
Corso Flower & Garden Center	Erie	Wind	50.00	kW	3404 Milan Rd. Sandusky, OH 44870
Dean Koch	Erie	Wind	1.90	kW	
Dunlaps Snow Removal	Erie	Wind	1.80	kW	11202 Ransom Road, Monroeville, OH 44847
Encore Industries, Inc.	Erie	Wind	50.00	kW	319 Howard Drive, Sandusky, OH 44870-8607
Jerry Owens	Erie	Wind	2.40	kW	
Melvin Poepelman	Erie	Wind	10.00	kW	
Myers Brothers Custom Butchering	Erie	Wind	33.00	kW	603 Bogart Rd. Huron, Ohio 44839
Perkins Board of Education	Erie	Wind	60.00	kW	
Precision Paving, Inc.	Erie	Solar PV	11.00	kW	3414 St. Rt. 113 East Milan OH 44846
Primary Excavation & Fabrication, Inc.	Erie	Wind	1.80	kW	9804 Frailey Road Huron, OH 44839-9752
Robert T. Bair, Jr.	Erie	Solar PV	5.00	kW	3622 Edgewater Dr. Vermilion, OH 44089
Shepherd Shoreline Construction, Inc.	Erie	Wind	50.00	kW	730 E Washington Street, Sandusky, OH 44870
Steven P Pullano	Erie	Wind	10.00	kW	
The Chef's Garden	Erie	Wind	100.00	kW	9009 Huron-Avery Rd, Huron, Ohio 44839
Toft Dairy, Inc.	Erie	Wind	50.00	kW	<b>3717 Venice Road, Sandusky, OH 44870</b>
Ventus Delcto HHS Property Mgmt	Erie	Wind	100.00	kW	

(Encore Plastics)					
Wilkes & Company	Erie	Wind	10.00	kW	
City of Oberlin	Lorain	Natural Gas	19.30	kW	Various site locations within the city
City of Oberlin	Lorain	Diesel Fuel	1.00	MW	Various site locations within the city
City of Wellington	Lorain	Diesel Fuel	1.10	MW	
Lorain County Landfill	Lorain	Bio Fuels	7,800.00	kW	43502 Oberlin Elyria Rd, Oberlin, OH 44074
McDaniel Residence	Lorain	PV & Solar Thermal	3.10	kW	493 E College St., Oberlin OH 44074
Morog Residence	Lorain	Wind	2.40	kW	13020 Green Rd., Wakeman OH 44889
Oberlin College	Lorain	Solar PV	100.00	kW	122 Elm St., Oberlin OH 44074
Oberlin College	Lorain	Solar PV	60.00	kW	122 Elm St., Oberlin OH 44074
Oberlin Municipal Light & Power	Lorain	Solar PV	3.80	kW	289 South Professor St. Oberlin OH 44074
Rybarcyk Residence	Lorain	Solar PV	7.30	kW	42525 Albrecht Rd., Oberlin, OH 44035
Rybarcyk Residence	Lorain	Wind	0.20	kW	42526 Albrecht Rd., Oberlin, OH 44035
Thompson Residence	Lorain	Solar PV	3.90	kW	216 Hollywood St. Oberlin OH 44074
Frantz Residence	Lorain	Solar PV	2.00	kW	53 King St., Oberlin OH 44074
Gerald Friesenhengst	Lorain	Wind	10.00	kW	13911 Kneisel Rd., Vermilion OH 44089
Bayshore Power Plant	Lucas	Coal	498,800.00	kW	* See note below - 4701 Bayshore Rd., Oregon, OH 43616
Bayshore Power Plant	Lucas	Petroleum Coke	140,600.00	kW	* See note below - 4701 Bayshore Rd., Oregon, OH 43616
Bayshore Power Plant	Lucas	Diesel Fuel	16.00	MW	* See note below - 4701 Bayshore Rd., Oregon, OH 43616
Bintz Residence - Bintz Residence	Lucas	Solar PV	4.20	kW	7103 Secluded Pines Drive, Maumee OH 43537
City of Toledo Waste Water Plant	Lucas	Bio Fuels	10,000.00	kW	Bay View Treatment Plant
City of Toledo Water Treatment Plant	Lucas	Solar PV	1,000.00	kW	Collins Park, Toledo OH 43605
City of Toledo - Government Center	Lucas	Solar PV	20.00	kW	Downtown, Toledo Ohio, 43604
Compaan Residence	Lucas	Solar PV	4.30	kW	9135 W. Bancroft, Holland, OH 43528
Crane Creek	Lucas	Solar PV	10.00	kW	1-800-945-3543
Gradkowski Residence	Lucas	Solar PV	1.80	kW	
Collins Residence	Lucas	Solar PV	5.00	kW	
Lundgren Residence	Lucas	Solar PV	1.50	kW	
I-280	Lucas	Solar PV	117.00	kW	
Lucas County Waste Water Treatment Plant	Lucas	Bio Fuels	365.00	kW	Maumee, Ohio 43537
Madonna Homes, Inc.	Lucas	Solar Thermal	2.10	kW	722 North Huron Street, Toledo, OH 43604-1772
Metzgers Arco PV Solar	Lucas	Solar PV	54.00	kW	207 Arco Dr., Toledo OH 43607
Midwest Property Associates Ltd.	Lucas	Solar PV	52.40	kW	5702 Opportunity Drive, Toledo OH 43612
Maumee Bay State Park	Lucas	Wind	10.00	kW	
Ohio PV Solar Six LLC	Lucas	Solar PV	59.80	kW	
Ohio National Guard / Toledo Express Airport	Lucas	Solar PV	1,570.00	kW	Eber Rd. Toledo, OH
Ohio Air National Guard (OANG)	Lucas	Solar PV	2.10	kW	Toledo - Xunlight

Oregon City Schools - Eisenhower Jr. High	Lucas	Wind	750.00	kW	331 N. Curtice Rd., Oregon, Ohio 43616
Oregon City Schools - Clay HS	Lucas	Wind	750.00	kW	5665 Seaman Rd., Oregon, Ohio 43616
Owens Community College	Lucas	Wind	50.00	kW	P.O. Box 10,000, Toledo, Ohio 43699-1947
SoCore-HealthCareREIT-Headquarters	Lucas	Solar PV	248.60	kW	4500 Dorr Street, Toledo OH 43607
St. Vincent Hospital	Lucas	Natural Gas	4,000.00	kW	Cherry St. Toledo, Ohio
Sunoco Refinery	Lucas	Natural Gas	60.00	kW	Rt. 2, Oregon, Ohio 43616
Sylvania Scools	Lucas	Wind	2.00	kW	Sylvania, Ohio
Sylvania United Church of Christ	Lucas	Solar PV	6.40	kW	7240 Erie St., Sylvania OH 43560
Toledo Seagate Convention Center	Lucas	Micro Turbines	260.00	kW	401 Jefferson Avenue, Toledo
Toledo Museum of Art	Lucas	Solar PV	101.00	kW	2445 Monroe Street, Toledo OH 43620
Toledo Museum of Art	Lucas	Solar PV	100.00	kW	2445 Monroe Street, Toledo, OH 43604
Toledo Museum of Art	Lucas	Solar PV	100.00	kW	2445 Monroe Street, Toledo, OH 43604
Toledo Museum of Art	Lucas	Solar PV	100.00	kW	2445 Monroe Street, Toledo, OH 43604
Toledo Museum of Art	Lucas	Micro Turbines	260.00	kW	2445 Monroe Street, Toledo, OH 43604
Toledo Zoo	Lucas	Wind	10.00	kW	2700 Broadway St, Toledo OH 43609
Toledo Zoo	Lucas	Solar PV	1.20	kW	2700 Broadway St, Toledo OH 43609
Toledo Zoo Solar Walk	Lucas	Solar PV	98.10	kW	2700 Broadway St, Toledo OH 43609
TZ Solar	Lucas	Solar PV	100.00	kW	
University of Toledo at Scott Park	Lucas	Solar PV	1,100.00	kW	200 W. Scott Park Dr., Toledo OH 43607
Black Diamond Inc.	Lucas	Solar Thermal	2.60	kW	
Frank Ulrich	Lucas	Wind	10.00	kW	
Greg Baker	Lucas	Wind	2.40	kW	
Homewood Press, Mark Dubuc, VP	Lucas	Wind	3.70	kW	
James E. Moore	Lucas	Wind	2.40	kW	
Jeremy & Robin Scott	Lucas	Solar PV	4.80	kW	
John A Dandar	Lucas	Wind	10.00	kW	
Knitz Greenhouse	Lucas	Wind	10.00	kW	8865 Arquette Road, Oregon, OH 43618
Lial Elementary School	Lucas	Solar PV	1.10	kW	
Mareda, Inc.	Lucas	Solar PV	20.00	kW	1931 Scottwood Ave # 700, Toledo, Ohio 43260
Mary Witte	Lucas	Solar PV	2.80	kW	
Matrix Technologies Inc.	Lucas	Solar PV	14.40	kW	1760 Indian Wood Circle, Maumee, OH 43537
Metropolitan Park District of Toledo Area	Lucas	Solar PV	10.00	kW	5100 W Central Avenue, Toledo, OH 43615
Metropolitan Park District of Toledo Area	Lucas	Solar PV	6.50	kW	
Metzgers Frenchmans PV Solar	Lucas	Solar PV	72.00	kW	3246 Frenchmans Rd., Toledo OH 43607
Michaelmas Manor	Lucas	Solar PV	20.00	kW	3260 Schneider Rd. Toledo OH 43614
Ohio Asphalt Roofing Co. Inc	Lucas	Solar PV	35.90	kW	
Ohio PV Solar Development Five, LLC	Lucas	Solar PV	71.70	kW	

Oregon City Schools - Clay HS	Lucas	Wind	5.20	kW	5721 Seaman Road . Oregon, OH 43616
Rebecca Walters Bardwell	Lucas	Solar PV	1.00	kW	
SoCore Solar 7, LLC	Lucas	Solar PV	248.40	kW	
Solterra	Lucas	Solar PV/Wind	4.30	kW	Curtice
The Maumee Bay General Store, Inc.	Lucas	Wind	100.00	kW	7438 Jerusalem Road Curtice, OH 43412
The Olander Park System	Lucas	Solar PV	14.40	kW	6930 Sylvania Ave., Sylvania OH 43560
University of Toledo	Lucas	Solar PV	1.20	kW	2801 W. Bancroft St. (tracking unit)
University of Toledo	Lucas	Solar PV	1.20	kW	2801 W. Bancroft St. (top of Engineering Bld.)
University of Toledo	Lucas	Solar PV	12.00	kW	2600 Dorr St.
University of Toledo	Lucas	Solar PV	12.00	kW	Scott Park Campus, Toledo Ohio 43606
University of Toledo	Lucas	Wind	100.00	kW	Scott Park Campus, Toledo Ohio 43606
City of Genoa	Ottawa	Diesel	60.00	MW	Various site locations within the city
Davis Bessie	Ottawa	Nuclear	925,200.00	kW	Rt. 2, Jerusalem Township
Lake Erie Business Park	Ottawa	Wind	25.00	kW	St. Rt 2 Building 460, Port Clinton, OH 43453
Marblehead Wind, LLC	Ottawa	Wind	400.00	kW	9451 E. Harbor Rd, Lake Marblehead OH 43440
Pittman Residence	Ottawa	Solar PV	6.00	kW	3930 County Road 133, Elmore OH 43416
Denny & Sue Ann Krumnow	Ottawa	Wind	10.00	kW	
Gary Durivage	Ottawa	Wind	10.00	kW	
H-D Storage, Inc.	Ottawa	Wind	50.00	kW	
Jerry and Robin Giesler	Ottawa	Wind	17.50	kW	
Keith E. Heilman	Ottawa	Wind	3.70	kW	
Kenneth L. and Kathryn J. Mapes	Ottawa	Wind	9.00	kW	
McKenna's Inn	Ottawa	Wind	10.00	kW	Catawba Island Township
Murphy Muffler, Inc.	Ottawa	Wind	5.50	kW	
Ohio Air National Guard / Camp Perry	Ottawa	Solar PV	538.00	kW	Camp Perry
Ottawa County Landfill	Ottawa	Bio Fuels	4,200.00	kW	530 N Camp Rd, Port Clinton OH 43452
Rathbun Family Real Estate Group	Ottawa	Wind	33.00	kW	
Robert Williams	Ottawa	Wind	10.00	kW	
Rochelle J. Habel	Ottawa	Wind	1.80	kW	
Rohloff Bros., Inc.	Ottawa	Solar PV	1.40	kW	16030 W Moline Martin Rd, Graytown, OH 43432
Terry Blakenship	Ottawa	Wind	10.00	kW	
Witterhaven Marina & Campground	Ottawa	Wind	33.00	kW	
<b>SUB TOTAL - BIO FUELS</b>		<b>5 Locations</b>	<b>23.64</b>	<b>MW</b>	
<b>SUB TOTAL - COAL*</b>		<b>1 Location</b>	<b>121.00</b>	<b>MW</b>	* See note below
<b>SUB TOTAL - DIESEL FUEL</b>		<b>4 Locations</b>	<b>78.100</b>	<b>MW</b>	
<b>SUB TOTAL - MICRO TURBINES</b>		<b>2 Locations</b>	<b>520.00</b>	<b>kW</b>	
<b>SUB TOTAL - NATURAL GAS</b>		<b>3 Locations</b>	<b>4,025.30</b>	<b>kW</b>	
<b>SUB TOTAL - NUCLEAR</b>		<b>1 Location</b>	<b>908.00</b>	<b>MW</b>	95% operation status annually (7.556 billion kWh.)



<b>SUB TOTAL - PETROLEUM COKE</b>		<b>1 Location</b>	<b>140.60</b>	<b>MW</b>	
<b>SUB TOTAL - SOLAR PV</b>		<b>59 Locations</b>	<b>6,204.60</b>	<b>kW</b>	
<b>SUB TOTAL - SOLAR THERMAL</b>		<b>02 Locations</b>	<b>4.70</b>	<b>kW</b>	
<b>SUB TOTAL - WIND</b>		<b>49 Locations</b>	<b>3,047.70</b>	<b>kW</b>	
<b>SUB TOTAL - WIND &amp; SOLAR COMBINATION</b>		<b>02 Locations</b>	<b>7.40</b>	<b>kW</b>	
<b>GRAND TOTAL - 9TH. DISTRICT</b>			<b>1,464,643.70</b>	<b>kW</b>	<b>(1,465 MW)</b>

**Notes:**

Some of the wind installations are under construction and expected to be completed in 2011.

498.8 MW of Bayshore production (3 of 4 units) is inactive or in reserve. Unit #1 is fueled by petroleum coke and coal. There is also one 16 MW diesel generator at the facility.

This list does not include any standby or backup electric generation. There are hundreds of locations with various sizes varying from emergency generation capacity at healthcare facilities to portable generators owned by residential consumers. There is no way to accurately quantify the size or scope of this capacity.

## Appendix B:

### About Palmer Energy Company

Palmer Energy provides an independent outside source of expertise to secure a reliable supply of energy at the lowest practical cost for the client. **Palmer Energy is** not a marketer, broker, or utility, but *an integral member of a client's energy management team.*

The company was founded in 1980 as one of the first natural gas brokerage firms in the country. Today, in response to changes in the energy industry and business needs, Palmer Energy Company has evolved into a leading unbiased energy manager for over 250 entities with thousands of locations. Palmer Energy's clients include school districts, health care organizations, long-term care facilities, manufacturers, municipalities, churches, financial institutions, commercial laundries, office buildings, non-profit organizations, and purchasing groups.

The corporate office of Palmer Energy Company is located in downtown Toledo, OH with a branch office in Cleveland, OH.

#### **Our Expert Energy Services Include:**

- Energy consulting
- Energy procurement, including buying, selling, and transporting
- Energy investment
- Customized energy management services

#### **Energy Contract Negotiation for:**

- Natural gas supply
- Interstate pipeline capacity
- Local utility delivery
- Electric purchase and sales
- Gas utility pipeline bypasses

#### **Developing Energy Procurement Strategies for:**

- Existing industrial and commercial operations
- Cogeneration and power plant projects
- Price analysis and management
- Utility/Supplier negotiation
- Utility rate analysis

