EXHIBIT NO. _____

BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of	)	
Columbus Southern Power Company for	)	
Approval of its Electric Security Plan; an	)	Case No. 08- 917-EL-~~UNC~~
Amendment to its Corporate Separation	)	SSO
Plan; and the Sale or Transfer of Certain	)	
Generating Assets	)	
	)	
and	)	
	)	
In the Matter of the Application of	)	
Ohio Power Company for Approval of	)	
its Electric Security Plan; and an	)	Case No. 08- 918-EL-~~UNC~~
Amendment to its Corporate Separation	)	SSO
Plan	)	

DIRECT TESTIMONY
OF
WILLIAM K. CASTLE
ON BEHALF OF
COLUMBUS SOUTHERN POWER COMPANY
AND
OHIO POWER COMPANY

Filed: July 31, 2008

1	BEFORE
2	THE PUBLIC UTILITIES COMMISSION OF OHIO
3	DIRECT TESTIMONY OF
4	WILLIAM K. CASTLE
5	ON BEHALF OF
6	COLUMBUS SOUTHERN POWER COMPANY
7	AND
8	OHIO POWER COMPANY
9	PUCO CASE NO. 08-917-EL-UNC
10	PUCO CASE NO. 08-918-EL-UNC
11	

12 **PERSONAL DATA**

13 **Q. WHAT IS YOUR NAME AND BUSINESS ADDRESS?**

14 A. My name is William K. Castle and my business address is 1 Riverside Plaza,

15 Columbus, Ohio 43215.

16 **Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

17 A. I am employed by American Electric Power Service Corporation. My title is

18 Director – DSM and Resource Planning.

19 **Q. WHAT IS YOUR EDUCATIONAL AND PROFESSIONAL**

20 **BACKGROUND?**

21 A. I received a Bachelor's of Science Degree in Mechanical Engineering in 1988

22 from Tulane University and a Masters Degree in Business Administration in

23 Finance from The University of Texas - Austin in 1998. I hold the Chartered

24 Financial Analyst (CFA) designation. In my current capacity, I am engaged in the

25 development of the Company's Integrated Resource Plan with attention to the

26 employment of demand side resources, which include demand response and

27 energy efficiency. Previous to my current position, I oversaw the capital and

28 O&M budgets for the corporation. Prior to joining AEP, I was employed by

1		NiSource, formally Columbia Energy Group, and held positions in Corporate
2		Finance and Financial Planning.
3	**Q.**	**WHAT IS THE PURPOSE OF YOUR TESTIMONY?**
4	A.	First, my testimony describes the methodology employed in determining the
5		alternative energy and renewable energy benchmarks, including the sub-
6		requirement for solar energy, as well as the energy efficiency and peak demand
7		reduction requirements for the years 2009-2011, as described in Am. Sub. No.
8		221 (S.B. 221) for Columbus Southern Power Company (CSP) and Ohio Power
9		Company (OPCo), the Companies, collectively. As will be described
10		subsequently in further detail, the benchmarks are a function of normalized retail
11		sales and peak loads, adjustments for economic growth, and the interaction of
12		advanced energy attainment in a given year, specifically energy efficiency
13		attainment, with renewable energy benchmarks in subsequent years. Company
14		witness Mr. Godfrey will describe the renewable benchmark compliance strategy
15		and Company witness Ms. Sloneker will describe the energy efficiency and peak
16		demand reduction compliance strategies. Second, I discuss the estimated costs of
17		compliance of the renewable energy benchmarks from 2009-2011 relative to the
18		cost of otherwise producing or acquiring the requisite energy for those years.
19	**Q.**	**WHAT ARE THE KEY COMPONENTS OF THE METHODOLOGY**
20		**USED TO CALCULATE THE ALTERNATIVE ENERGY**
21		**BENCHMARKS?**
22	A.	Several assumptions are inherent in the method used to quantify the benchmarks.
23		They are:

2

1	1.	In all cases, weather-normalized retail sales are used. That is, not only are
2		normalized values used in the determination of the energy efficiency and
3		peak demand requirements, but also in the renewable benchmark
4		determination. Sales are normalized using a method consistent with
5		industry standards and in accordance with my understanding of S.B. 221.
6	2.	Actual calendar year savings will be less than the full-year savings of the
7		programs in the year of implementation. For purposes of demonstration, it
8		is assumed that calendar year savings in the year of implementation will
9		equal 50% of the full-year savings (*i.e.*, a weighted average
10		implementation date of July 1). This assumption impacts the forecasted
11		baselines and resultant requirements in subsequent years. The actual
12		results achieved will impact the ultimate requirements that will apply in
13		those subsequent years.
14	3.	Energy efficiency program implementation will have the collateral effect
15		of reducing peak demand. As discussed below, I assumed that for every
16		4,000 MWhs of energy efficiency achieved, 1 MW of demand is reduced,
17		coincident with the peak. This is equivalent to, and also referred to as, a
18		"conservation load factor" of 4,000. This assumption also impacts the
19		forecasted baselines in subsequent years, but again, the actual results will
20		impact the ultimate baselines and resultant requirements that will apply in
21		those subsequent years.

1   4.   Consistent with my understanding of S.B. 221, adjustments to the baseline

2   were made for economic development. The support for those baseline

3   adjustments is sponsored by Company witness Mr. Baker.

4   5.   Although not yet quantified, mercantile capabilities committed under

5   Section 4928.64 of S.B. 221 will contribute to energy efficiency and/or

6   peak demand reduction requirement satisfaction. Committed capabilities

7   will also have an associated upward adjustment to the respective baselines.

8   6.   Any other adjustments necessary due to regulatory, economic, or

9   technological reasons beyond the reasonable control of the Companies,

10   while not anticipated at this time, could further adjust the baselines.

11   Q.   **WHAT IS THE ALTERNATIVE ENERGY BENCHMARK AND HOW IS**

12   **THE BENCHMARK DETERMINED?**

13   A.   The alternative energy requirement requires that 25% of the retail energy sold

14   come from alternative energy sources by 2025 (the resources must be in place by

15   year-end 2024). The alternative energy requirement has two main constituents,

16   advanced energy and renewable energy. The renewable energy benchmark

17   requires that renewable resources are in place by 2025 such that at least 12.5% of

18   applicable energy sales in 2025 and thereafter is produced from renewable

19   sources. There is a further sub-requirement that solar energy constitutes at least

20   0.5% of retail sales by 2025. There are annual benchmarks, beginning in 2009,

21   for the renewable and solar requirement and sub-requirement, respectively. The

22   benchmarks for 2009-2011 will be addressed later in my testimony.

1   Advanced energy must comprise the balance of the 25% energy

2   requirement not attained with renewable energy. Energy efficiency, which can be

3   used to meet the alternative energy requirements, within the umbrella of advanced

4   energy, must produce prescribed annual reductions in energy usage that add to

5   22.2% of retail energy sold. Additionally, peak demand must be reduced 7.75%

6   by 2018.

7 **Q. WHAT ARE THE RENEWABLE ENERGY BENCHMARKS?**

8 A.   The renewable energy benchmark prescribes that at least 12.5% of the retail

9   energy sales come from renewable energy resources by 2025. Renewable energy

10   includes energy produced from solar, wind, hydro, geothermal, and solid waste

11   sources. Additionally, the solar component must comprise at least 0.5% of the

12   retail sales by 2025. There are annual, year-end benchmarks that, if met, will

13   result in the attainment of the 2025 renewable and solar requirement.

14 **Q. HOW DO THE ENERGY EFFICIENCY REQUIREMENTS FIT INTO**

15   **THE ALTERNATIVE ENERGY REQUIREMENTS?**

16 A.   Advanced energy must comprise the balance of the 25% alternative energy

17   requirement not achieved via the renewable energy benchmarks. Advanced

18   energy includes energy efficiency, distributed generation, clean coal, and

19   advanced nuclear technologies. While there are not specific annual benchmark

20   requirements for advanced energy, there are for energy efficiency. Because

21   energy efficiency is an advanced energy resource, it is inferred that compliance

22   with the energy efficiency requirement alone will be sufficient to keep the

5

1   Companies progressing toward the advanced energy share of the 2025 alternative

2   energy requirement.

3 Q. **HOW ARE THE ENERGY EFFICIENCY BENCHMARKS**

4   **DETERMINED?**

5 A. The benchmarks for energy efficiency must be calculated first as the results

6   achieved will affect the baseline retail energy sales used in calculating the

7   renewable energy benchmarks and the baseline peak demand used in calculating

8   the peak demand reduction requirements.

9   Starting with normalized retail sales for 2006 and 2007 and a forecast for

10   2008, and adjusting for economic growth and mercantile commitments, an

11   "Adjusted Retail Sales Baseline" is defined. The three-year average of these

12   years (2006-2008) is calculated, and then multiplied by the requirement in S.B.

13   221 to further define the Year-end Energy Efficiency Benchmark

14   (Implementation). The Forecast Energy Efficiency Achievement is the

15   Implementation multiplied by the assumption for calendar year attainment (50%)

16   which serves to adjust future baselines.

17   Shown in EXHIBITS WKC-1a, and WKC-1b, are the calculations,

18   described above, for the energy efficiency goals for CSP and OPCo, respectively.

19   While the exhibits show attainment of the energy efficiency benchmarks, it is

20   possible that benchmarks will be exceeded in a given year and that excess would

21   then be carried over into the subsequent year(s), partially satisfying the

22   subsequent benchmark(s).

1 Q. **HOW SENSITIVE ARE THE YEAR-END IMPLEMENTATION**

2   **BENCHMARKS TO THE ASSUMPTION OF FORECAST CALENDAR**

3   **YEAR ACHIEVEMENT?**

4 A. The benchmark for calendar year 2010 is virtually unaffected by this assumption.

5   For example, increasing the assumption to 75% for 2009 (a weighted-average

6   program implementation date of April 1, 2009) reduces the 2010 benchmark by

7   less than .03 GWhs for each company relative to the assumed timing effect.

8   Decreasing the assumption to 25% for 2009 (weighted average program

9   implementation date of October 1, 2009), increases the 2010 benchmark by a

10   corresponding amount. That equates to significantly less than a tenth of a percent

11   difference in the benchmark from what is presented.

12 Q. **WHAT ARE THE PEAK DEMAND REDUCTION BENCHMARKS AND**

13   **HOW ARE THEY CALCULATED?**

14 A. The peak demand reduction benchmarks are calculated similarly to the energy

15   efficiency benchmarks with the same manner of adjustments. Normalized peaks

16   for the years 2006 and 2007 and the forecasted peak for 2008 are adjusted for

17   economic growth and mercantile commitments to define Adjusted Peak demand

18   for these years. From the average of those years, the goal for 2009 is defined by

19   multiplying the percentage goal from S.B. 221. In subsequent years, the Adjusted

20   Peak Demand baseline includes a reduction in peak demand that results from the

21   collateral effects of energy efficiency program implementation. EXHIBITS

22   WKC-2a and WKC-2b show the peak reduction adjustments and calculations for

7

1		CSP and OPCo, respectively. Again, over-attainment of a benchmark in one year,
2		should it occur, is expected to help satisfy the subsequent benchmark(s).
3	Q.	**WHAT IS THE CONSERVATION LOAD FACTOR'S IMPACT ON THE**
4		**PEAK DEMAND GOALS?**
5	A.	Energy efficiency programs seek to reduce energy consumption, regardless of
6		when that (reduced) consumption may occur. However, some of that reduction
7		will occur during the hours of peak consumption. When consumption is reduced
8		during the peak hours, the peak is also reduced. For a given energy efficiency
9		measure, the ratio of the energy (MWh) saved to the peak demand reduction
10		realized (MW) is referred to as the Conservation Load Factor (CLF). A CLF of
11		4,000 is fairly representative of the measures that are likely to be employed in
12		programs that CSP and OPCO will offer to their customers.
13	Q.	**HOW SENSITIVE ARE THE PEAK REDUCTION BENCHMARKS TO**
14		**THIS ASSUMPTION?**
15	A.	The 2009 benchmark is unaffected as it is a function of normalized peaks from the
16		preceding three years. Varying the assumption of CLF to 1,000 would have the
17		effect of reducing the 2010 peak demand reduction goal by significantly less than
18		a megawatt for both companies. Increasing the CLF assumption to 7,000 would
19		increase the 2010 goal almost imperceptibly.
20	Q.	**HOW ARE THE RENEWABLE ENERGY BENCHMARKS**
21		**CALCULATED?**
22	A.	The same methodology used to calculate the energy efficiency benchmarks is
23		used to arrive at the renewable energy benchmarks. Normalized retail sales for

1		2006 and 2007 and the forecast for 2008 are adjusted for economic growth. The
2		Adjusted Retail Sales are then multiplied by the annual renewable energy targets
3		specified in S.B. 221. As previously stated, beginning in 2010, the effects of the
4		energy efficiency program are reflected as an additional adjustment to the
5		baseline. EXHIBITS WKC-3a and WKC-3b show the total renewable
6		benchmarks and the breakout of solar and non-solar benchmarks for CSP and
7		OPCo, respectively. As with energy efficiency and peak demand reduction, over-
8		attainment of a benchmark in one year, should it occur, will be carried over into
9		the subsequent year(s) to help satisfy those benchmarks.
10	**Q.**	**WILL THE COST OF ACHIEVING THE RENEWABLE BENCHMARKS**
11		**EXCEED 3% OF THE COST TO OTHERWISE PRODUCE OR ACQUIRE**
12		**THE REQUISITE ELECTRICITY DURING 2009-2011?**
13	**A.**	When measured on a levelized $/MWh, basis relative to electricity available for
14		purchase or the cost to generate electricity with existing resources, solar and wind
15		(and other renewable resource) costs, as discussed by Mr. Godfrey, exceed
16		purchased power prices and exceed the internal cost of generation by more than
17		3% for the years covered in this plan. However, when viewed as a portfolio, and
18		including the existing assets of CSP and OPCo, the expected cost of a compliant
19		portfolio (renewable portfolio), compared to a portfolio that substitutes energy
20		purchased at market prices in lieu of the renewable sources (market portfolio),
21		and compared to a portfolio that uses existing generation resources exclusively
22		(existing portfolio), the renewable portfolio cost does not exceed the market or
23		existing portfolio costs by 3% in the years covered by this plan.

9

1　Q.　**DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

2　A.　Yes, it does.

Exhibit 1a

Columbus Southern Co. Energy Efficiency Benchmarks 2009-2011

Energy Efficiency- CSP

all units in GWh unless noted

	Actual Retail Sales	Normalized Retail Sales	Forecast Retail Sales	Adjustments for Economic Growth[1]	Adjustment for Committed Mercantile Capabilities[2]	Forecast EE Achievement[3]	Adjusted Retail Sales Baseline	Preceding 3-Yr Retail Sales Average	Year-end EE Benchmark	Year-end EE Benchmark (implemented)
2006	19,567	19,807		(1,596)	+	-	18,211			
2007	22,010	21,630		(3,135)	+	-	18,496			
2008			22,466	(3,734)	+	-	18,731			
2009			22,562	(3,734)	+	(28)	18,800	18,479	0.3%	55
2010			22,754	(3,734)	+	(102)	18,917	18,675	0.5%	93
2011					+			18,816	0.7%	132

Exhibit 1b

Ohio Power Company Energy Efficiency Benchmarks 2009-2011

Energy Efficiency- OPCO

all units in GWh unless noted

	Actual Retail Sales	Normalized Retail Sales	Forecast Retail Sales	Adjustments for Economic Growth[1]	Adjustment for Committed Mercantile Capabilities[2]	Forecast EE Achievement[3]	Adjusted Retail Sales Baseline	Preceding 3-Yr Retail Sales Average	Year-end EE Benchmark	Year-end EE Benchmark (implemented)
2006	25,262	25,588		(0)	+	-	25,588			
2007	27,726	27,535		(1,492)	+	-	26,042			
2008			28,033	(2,312)	+	-	25,721			
2009			28,192	(2,312)	+	(39)	25,841	25,784	0.3%	77
2010			28,315	(2,312)	+	(142)	25,861	25,868	0.5%	129
2011					+			25,807	0.7%	181

[1] 2008 results Jan-Jun are annualized; subsequent years are estimated at 2008 levels.

[2] Capabilities committed by eligible mercantile customers that help satisfy Benchmarks will increase the baseline.

[3] Assumes initial year impact of installed efficiency measures equal to 50% of achieved implementation at a CLF of 4,000.

Exhibit 2a Columbus Southern Power – Peak Demand Reduction Benchmarks 2009-2011

Peak Demand Reduction - CSP

All units in megawatts unless noted

	Actual Peak Demand	Normalized Peak Demand	Forecast Peak Demand	Adjustments for Economic Growth[1]	Adjustment for Committed Mercantile Capabilities[2]	Reductions to Peak Demand from EE[3]	Adjusted Peak Demand Baseline		Preceding 3-Yr Average	Year-end Peak Reduction Benchmark	Peak Reduction Benchmark (MW)
2006	4,425	4,261		(266)	+		3,995				
2007	4,723	4,415		(410)	+		4,004				
2008			4,653	(509)	+		4,144				
2009			4,722	(509)	+	(7)	4,206		4,048	1.00%	40
2010			4,757	(509)	+	(26)	4,222		4,118	1.75%	72
2011					+				4,191	2.50%	105

Exhibit 2b Ohio Power Company – Peak Demand Reduction Benchmarks 2009-2011

Peak Demand Reduction - OPCO

All units in megawatts unless noted

	Actual Peak Demand	Normalized Peak Demand	Forecast Peak Demand	Adjustments for Economic Growth[1]	Adjustment for Committed Mercantile Capabilities[2]	Reductions to Peak Demand from EE[3]	Adjusted Peak Demand Baseline		Preceding 3-Yr Average	Year-end Peak Reduction Benchmark	Peak Reduction Benchmark (MW)
2006	5,260	5,256		-	+		5,256				
2007	5,485	5,410		(204)	+		5,206				
2008			5,544	(276)	+		5,268				
2009			5,597	(276)	+	(10)	5,311		5,243	1.00%	52
2010			5,611	(276)	+	(36)	5,299		5,262	1.75%	92
2011					+				5,293	2.50%	132

[1] Individual customer peak demand estimated where not metered.

[2] Capabilities committed by eligible mercantile customers that help satisfy Benchmarks will increase the baseline.

[3] Assumes initial year impact of installed efficiency measures equal to 50% of achieved implementation at a CLF of 4,000.

Exhibit 3a Columbus Southern Power Renewable Energy Benchmarks 2009-2011.

Total Renewable - CSP

all units in GWh unless noted

	Actual Retail Sales	Normalized Retail Sales	Forecast Retail Sales	Adjustments for Economic Growth[1]	EE Achievement[2]	Adjusted Baseline		Preceding 3-Yr Average	Year-end Renewable Benchmark	Year-end Renewable Benchmark (GWh)
2006	19,567	19,807		(1,596)	-	18,211				
2007	22,010	21,630		(3,135)	-	18,496				
2008			22,466	(3,734)	-	18,731				
2009			22,562	(3,734)	(28)	18,800		18,479	0.25%	46
2010			22,754	(3,734)	(102)	18,917		18,675	0.50%	93
2011								18,816	1.00%	188

Solar - CSP

	Actual Retail Sales	Normalized Retail Sales	Forecast Retail Sales	Adjustments for Economic Growth[1]	EE Achievement[2]	Adjusted Baseline		Preceding 3-Yr Average	Year-end Solar Benchmark	Year-end Solar Benchmark (GWh)
2006	19,567	19,807		(1,596)	-	18,211				
2007	22,010	21,630		(3,135)	-	18,496				
2008			22,466	(3,734)	-	18,731				
2009			22,562	(3,734)	(28)	18,800		18,479	0.004%	0.739
2010			22,754	(3,734)	(102)	18,917		18,675	0.010%	1.868
2011								18,816	0.030%	5.645

Non-Solar Renewable - CSP

	Actual Retail Sales	Normalized Retail Sales	Forecast Retail Sales	Adjustments for Economic Growth[1]	EE Achievement[2]	Adjusted Baseline		Preceding 3-Yr Average	Year-end Non-Solar Renewable Benchmark	Year-end Non-Solar Renewable Benchmark (GWh)
2006	19,567	19,807		(1,596)	-	18,211				
2007	22,010	21,630		(3,135)	-	18,496				
2008			22,466	(3,734)	-	18,731				
2009			22,562	(3,734)	(28)	18,800		18,479	0.25%	45
2010			22,754	(3,734)	(102)	18,917		18,675	0.49%	92
2011								18,816	0.97%	183

[1] 2008 results Jan-Jun are annualized; subsequent years are estimated at 2008 levels.

[2] Assumes initial year impact of installed efficiency measures equal to 50% of achieved implementation at a CLF of 4,000.

Exhibit 3b. Ohio Power Company Renewable Energy Benchmarks 2009-2011.

Total Renewable - OPCO

all units in GWh unless noted

	Actual Retail Sales	Normalized Retail Sales	Forecast Retail Sales	Adjustments for Economic Growth[1]	EE Achievement[2]	Adjusted Baseline		Preceding 3-Yr Average	Year-end Renewable Benchmark	Year-end Renewable Benchmark (GWh)
2006	25,262	25,588		(0)	-	25,588				
2007	27,728	27,535		(1,492)	-	26,042				
2008			28,033	(2,312)	-	25,721				
2009			28,192	(2,312)	(39)	25,841		25,784	0.25%	64
2010			28,315	(2,312)	(142)	25,861		25,868	0.50%	129
2011								25,807	1.00%	258

Solar - OPCO

	Actual Retail Sales	Normalized Retail Sales	Forecast Retail Sales	Adjustments for Economic Growth[1]	EE Achievement[2]	Adjusted Baseline		Preceding 3-Yr Average	Year-end Solar Benchmark	Year-end Solar Benchmark (GWh)
2006	25,262	25,588		(0)	-	25,588				
2007	27,728	27,535		(1,492)	-	26,042				
2008			28,033	(2,312)	-	25,721				
2009			28,192	(2,312)	(39)	25,841		25,784	0.004%	1.031
2010			28,315	(2,312)	(142)	25,861		25,868	0.010%	2.587
2011								25,807	0.030%	7.742

Non-Solar Renewable - OPCO

	Actual Retail Sales	Normalized Retail Sales	Forecast Retail Sales	Adjustments for Economic Growth[1]	EE Achievement[2]	Adjusted Baseline		Preceding 3-Yr Average	Year-end Non-Solar Renewable Benchmark	Year-end Non-Solar Renewable Benchmark (GWh)
2006	25,262	25,588		(0)	-	25,588				
2007	27,728	27,535		(1,492)	-	26,042				
2008			28,033	(2,312)	-	25,721				
2009			28,192	(2,312)	(39)	25,841		25,784	0.246%	63
2010			28,315	(2,312)	(142)	25,861		25,868	0.490%	127
2011								25,807	0.970%	250

[1] 2008 results Jan-Jun are annualized; subsequent years are estimated at 2008 levels.

[2] Assumes initial year impact of installed efficiency measures equal to 50% of achieved implementation at a CLF of 4,000.