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WITNESS: Direct Testimony Of Jim Breman, Appearing On
Behalf Of Staff

Date Filed: June 14, 1996

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DIRECT TESTIMONY OF JIM BREMAN

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Q. Please state your name and business address.

A. My name is Jim Breman; 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850.

Q. By whom are you employed and in what capacity?

A. I am employed by the Florida Public Service Commission as an Engineer IV in the Bureau of Electric Regulation, Division of Electric and Gas.

Q. Please briefly describe your educational background and professional experience.

A. From April 1980 through December 1981 I was an engineering technician with Peoples Gas System Inc., North Miami Division. I graduated from Florida State University in 1986 with a Bachelor of Science in Mechanical Engineering. I was also employed by the College of Engineering while pursuing my degree at Florida State University.

I began employment with the Florida Public Service Commission in 1988 and have held various positions since that time. In June of 1993 I was promoted to my current position.

Q. What are your present responsibilities with the Commission?

A. My responsibilities include reviewing utility fuel price forecasts and the data filed for purposes of the Fuel Cost Recovery Clause and the Ten-Year Site Plans. I also analyze filings concerning underground vs. overhead distribution differentials, the environmental cost recovery clause and storm damage issues.

Q. Have you previously testified before this Commission?

A. Yes. I testified in Docket No.910615-EU that resulted in Rule 25-6.115

1 | F.A.C., Facility Charges For Providing Underground Facilities of Public
2 | Distribution Facilities Excluding New Residential Subdivisions. I have also
3 | made oral and written recommendations to the Commission on various occasions.

4 | Q. What is the purpose of your testimony?

5 | A. The purpose of my testimony is to describe why TECO's natural gas
6 | planning assumptions have been and continue to be erroneous. I also discuss
7 | why the cost effectiveness of the POLK IGCC should not be based on the use of
8 | petroleum coke (pet coke).

9 | Q. Have you prepared any exhibits that contain information to which you
10 | will refer in your testimony?

11 | A. Yes. I prepared three exhibits. Exhibit No. ___ (JEB-1) is a
12 | presentation of historical natural gas prices and various base case natural
13 | gas price forecasts made by TECO. Exhibit No. ___ (JEB-2), depicts historical
14 | natural gas and coal prices and the trend in their price differentials from
15 | January 1986 through December 1995. Exhibit No. ___ (JEB-3) is a series of
16 | tables presenting TECO's coal and natural gas price forecasts and the year-to-
17 | year differences between TECO's forecasted natural gas and coal prices.

18 | Q. Have TECO's 1992, 1993, 1994, and 1995 natural gas price forecasts been
19 | reasonably accurate?

20 | A. No. TECO's 1992, 1993, and 1994 natural gas price forecasts have been
21 | inaccurate as Exhibit No. ___ (JEB-1) shows. For example, in 1995, the price
22 | of natural gas was \$2.24 per million Btu. However, TECO's 1992, 1993 and 1994
23 | forecasts predicted prices of \$3.02, \$3.19, and \$2.81 per million Btu,
24 | respectively. TECO's inaccurate price trend continues to be present in the
25 | current Fall 1995 natural gas price forecast. TECO has consistently

1 overstated natural gas prices in every year and this results in an incorrect
2 bias against natural gas.

3 Q. Explain the bias in TECO's natural gas price forecasts.

4 A. TECO ignores the fact that natural gas competes with coal. This is not
5 a surprising phenomenon given the competitive changes that have occurred in
6 the electric fuels market.

7 Two major factors have changed the market for natural gas making it
8 competitive with coal. First, natural gas prices were deregulated allowing
9 market forces to control natural gas pricing. Repeal of the Fuel Use Act
10 lifted restrictions on the use of natural gas as a boiler fuel. The Natural
11 Gas Policy Act of 1978 removed wellhead price controls on the majority of gas
12 supplies on January 1, 1985 and July 1, 1987. Deregulation of natural gas was
13 furthered with the Federal Energy Regulatory Commission's (FERC) Order 636,
14 which provided open natural gas transmission access directly from the producer
15 to the distributor or end user.

16 The second major factor that has changed the market for natural gas
17 markets is the development of highly efficient and cost effective gas turbine
18 based combined cycle technology. This generating technology provides
19 considerable advantages over conventional fossil steam generation, not the
20 least of which is fuel-capital flexibility. The installed cost of a combined
21 cycle unit is comparatively low. Also, combined cycle units may be
22 constructed as integrated units or in phases using modular block sizes. The
23 combustion turbine can be installed first, then as load growth occurs and as
24 economics dictate, a steam recovery generator can be added. This allows for
25 a better match between load growth and unit size. The current predominance

1 of natural gas fired generation in the new power plant market demonstrates
2 these strategic planning advantages. Florida's natural gas fired combined
3 cycle generation is expected to increase from 5 percent of the state's
4 generation mix in 1993 to approximately 15 percent by 2004.

5 Q. When was it first apparent that natural gas was competing with coal in
6 the electric fuels market in Florida?

7 A. The competitive relationship between natural gas and coal appears to
8 have become established in the mid-1980's. Over the last ten years, the
9 average price difference between natural gas and coal has simply not
10 increased, as TECO predicted. It has converged towards an approximate price
11 difference of \$0.51 per million Btu as Exhibit No. ___ (JEB-2) shows.

12 Q. Are TECO's forecasted natural gas price and coal price differentials
13 similar to the historical differentials?

14 A. No. In the first year of every forecast, TECO's differentials are twice
15 the historical differentials. In Exhibit No. ___ (JEB-3), column (3), I show
16 TECO's constantly increasing natural gas and coal price differences. By the
17 year 2020, TECO's 1992, 1993, 1994 and 1995 forecasts indicate natural gas
18 price differences relative to coal prices of \$10.08, \$10.66, \$11.02 and \$6.96
19 per million Btu respectively. In effect, TECO has ignored the fact that
20 natural gas is competing with coal.

21 Q. Has the Commission expressed concerns about TECO's natural gas price
22 forecasts?

23 A. Yes. The Commission specifically stated its concerns in the Order
24 granting the determination of need for the TECO POLK IGCC, Order No. PSC-92-
25 002-FOF-EI, and more recently in its review of TECO's Ten-Year Site Plan

1 filings for 1994 and 1995.

2 In Order No. PSC-92-002-FOF-EI the Commission said:

3 The type of new generating unit chosen is not necessarily driven
4 by fuel cost per se; rather, it is the difference in cost among
5 competing fuels. TECO's fuel forecast projects a widening cost
6 differential between coal and natural gas or oil, when in fact for
7 many years the cost differential between the cost of coal and the
8 cost of natural gas and oil has remained relatively constant. In
9 the future, TECO should pay close attention to this differential,
10 and must be ready to substantiate continued reliance upon fuel
11 price forecasts that have not accurately predicted the
12 relationship between the price of coal and the price of natural
13 gas and oil. (Emphasis added)

14 The Commission made similar statements again in 1994. On page 26 of the
15 "REVIEW OF 1994 TEN-YEAR SITE PLANS" the Commission said:

16 To further determine the sensitivity of a project's success to a
17 change in fuel forecasts, a worst case scenario should be
18 evaluated. This worst case scenario is a final sanity check that
19 consists of holding current fuel price differentials constant
20 throughout the projection period. This test will reveal whether
21 a project will retain overall cost-effectiveness under severe and
22 continuing price drops.

23 On page 30 of the "REVIEW OF 1994 TEN-YEAR SITE PLANS" the Commission said:

24 FPL's and TECO's forecasts indicate an ever widening gap between
25 the price of coal and natural gas. These forecasts are not

1 indicative of historical trends that reflect market stability and
2 continued growth in production.

3 Then again, in 1995, in the "REVIEW OF 1995 TEN-YEAR SITE PLANS" the
4 Commission found it necessary to reiterate what it stated the prior year. On
5 pages 32 and 36, the Commission said:

6 To further determine this sensitivity, a worst case scenario
7 should also be evaluated as a sanity check. This is done by
8 holding the current fuel price differentials constant throughout
9 the projection period. This test will reveal whether a project
10 will retain overall cost-effectiveness under severe and continuing
11 price decreases.

12 ... Several utilities continue to forecast an ever-widening gap
13 between the price of coal and natural gas, which is not indicative
14 of historical trends that reflect market stability and continued
15 growth in production. Despite the bias against natural gas that
16 is inherent in these fuel price forecasts, natural gas still
17 appears to be the fuel of choice for most of the planned
18 generating units.

19 Q. How has TECO responded to the Commission's concerns regarding natural
20 gas price forecasting?

21 A. I do not know if TECO heeded the Commission's concerns. During his
22 deposition, Mr. Smith, TECO's Director of Fuels and Environmental, stated that
23 he was not aware of the Commission's review and comments on TECO's Ten-Year
24 Site Plans. He also did not know whether TECO's system planning section had
25 performed any worst case sensitivity evaluations. TECO apparently has not

1 | established a policy of doing a worst case analysis, such as holding the
2 | natural gas price constant relative to the price of coal.

3 | Q. Do you have other concerns with TECO's natural gas planning assumptions?

4 | A. Yes. TECO has not adequately evaluated its natural gas procurement
5 | options. From 1992 to the present, TECO has assumed that the only cost
6 | effective transportation of natural gas is interruptible or "as-available"
7 | transportation. In Staff's 1st Set of Interrogatories No.3, TECO was asked
8 | to identify all documents considered by TECO in reaching this conclusion.
9 | TECO did not identify any documents.

10 | On page 17 and 18 of Mr. Smith's direct testimony, he addresses special
11 | economic obstacles to adding natural gas-fired capacity to TECO's system. He
12 | states in part:

13 | ... Instead, for the foreseeable future any new gas-fired
14 | generation would dispatch as a peaker or intermediate-load unit
15 | on Tampa Electric's system. In addition, Tampa Electric does not
16 | have an outlet to absorb excess firm natural gas when that gas
17 | could not be used in its intended units. Accordingly, Tampa
18 | Electric is not a prime candidate for new natural gas-fired
19 | combined cycle capacity under current pipeline transportation
20 | costs and [on] our system based on the uneconomic take or pay
21 | nature of firm natural gas transportation.

22 | This assumption is flawed for two reasons. First, TECO apparently did
23 | not perform an economic analysis on its own to verify its own planning
24 | assumptions. Secondly, TECO apparently failed to recognize that there is a
25 | market for excess firm natural gas. For example, in 1995, Florida Power

1 Corporation obtained 1997 and 1998 natural gas transportation requirements for
2 its future POLK Station from the FGT secondary capacity market.

3 Q. Has TECO adequately evaluated the technical viability of burning pet
4 coke in the POLK IGCC?

5 A. No. It is not prudent to plan and justify the construction of the POLK
6 IGCC unit based on savings assumed using an untested fuel. In 1994,
7 preliminary analysis and engineering evaluations assessing the use of pet coke
8 in the POLK IGCC highlighted major problem areas. Mr. Black's composite
9 Exhibit CRB-1, contains a memorandum from TECO's design consultant that
10 states:

11 Given these unknowns, for pet coke blends, as well as for any
12 coals other than our design coal, a test burn must be completed
13 prior to any firm commitment on plant operating characteristics
14 or on long term fuel purchases. We are somewhat more comfortable
15 projecting performance with alternate coals since Texaco gasifiers
16 have operated with a range of coals. However, no Texaco gasifier
17 with syngas cooling has ever operated with a pet coke blend.

18 For these reasons, it is our recommendation that for any Pet Coke
19 blend to be considered as a long term operating fuel, a detailed
20 test program will have to be developed. This test program will
21 have to include a "test burn" phase in period where we can
22 gradually increase the percentage of pet coke over a period of
23 several months. Our ability to operate with these low pet coke
24 blends during the phase in period will have to be further
25 evaluated. (Emphasis not added)

1 I believe this is sound advice. The decision to continue construction
2 of the plant should have been based on the use of coal. Savings based on the
3 use of pet coke are highly speculative. Whether or not savings exist using
4 pet coke will not be known until it is tested in the POLK IGCC unit.

5 Q. Is the technical viability of pet coke the only concern you have?

6 A. No. Pet coke transportation and availability also need to be addressed.
7 TECO assumed that transportation would be either direct barge loading or that
8 there would be a cost effective means to transport pet coke from the pet coke
9 production plant(s) to a transfer facility and then barge it to the Big Bend
10 Station. Trucking, transloading, short haul rail, special barge requirements
11 from the pet coke production plant(s) to a transfer facility are all potential
12 hidden costs in TECO's use of pet coke. TECO has not demonstrated that they
13 have included these hidden costs in their evaluations of the use of pet coke
14 at the POLK IGCC unit.

15 Q. Does this conclude your testimony?

16 A. Yes.

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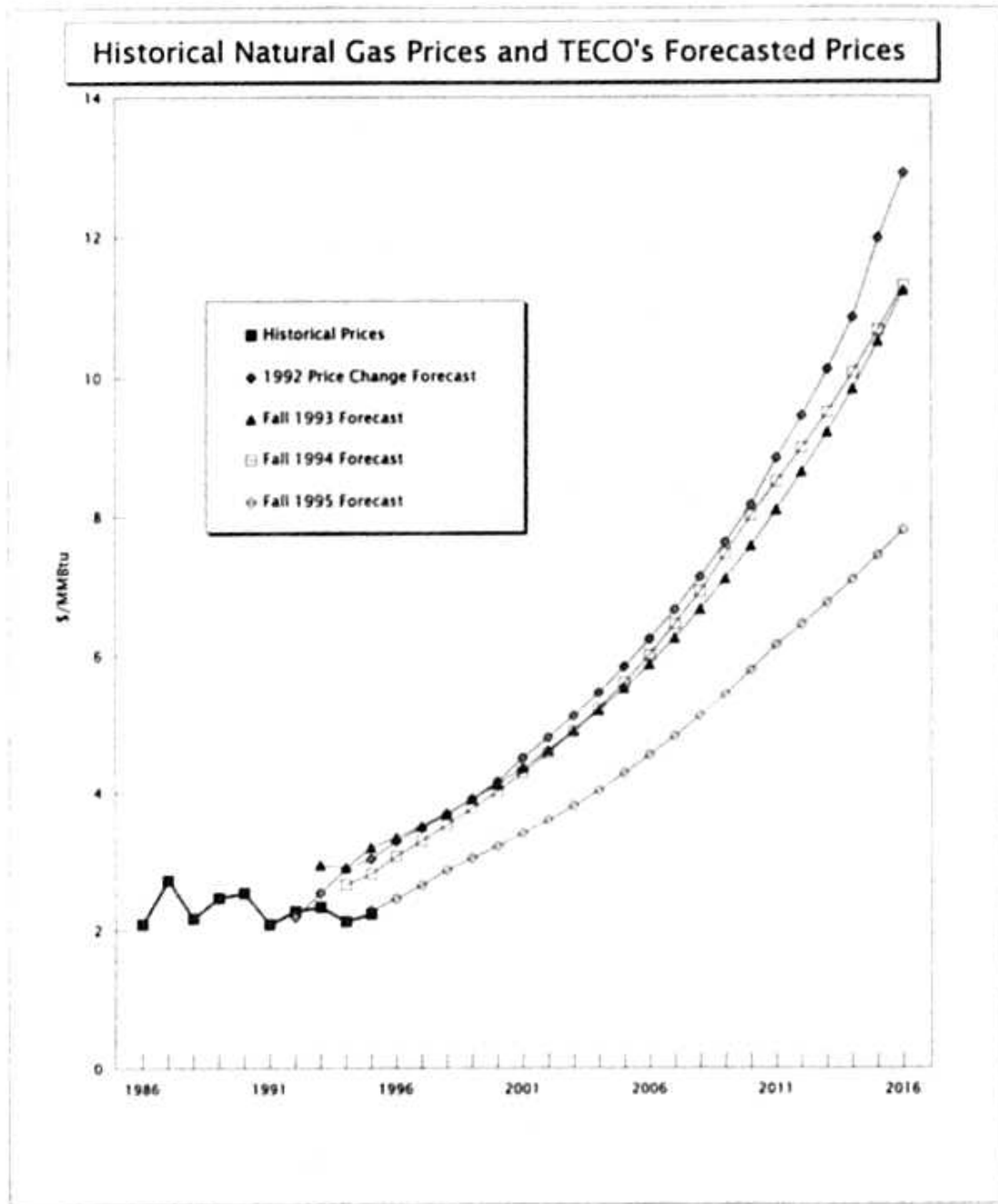
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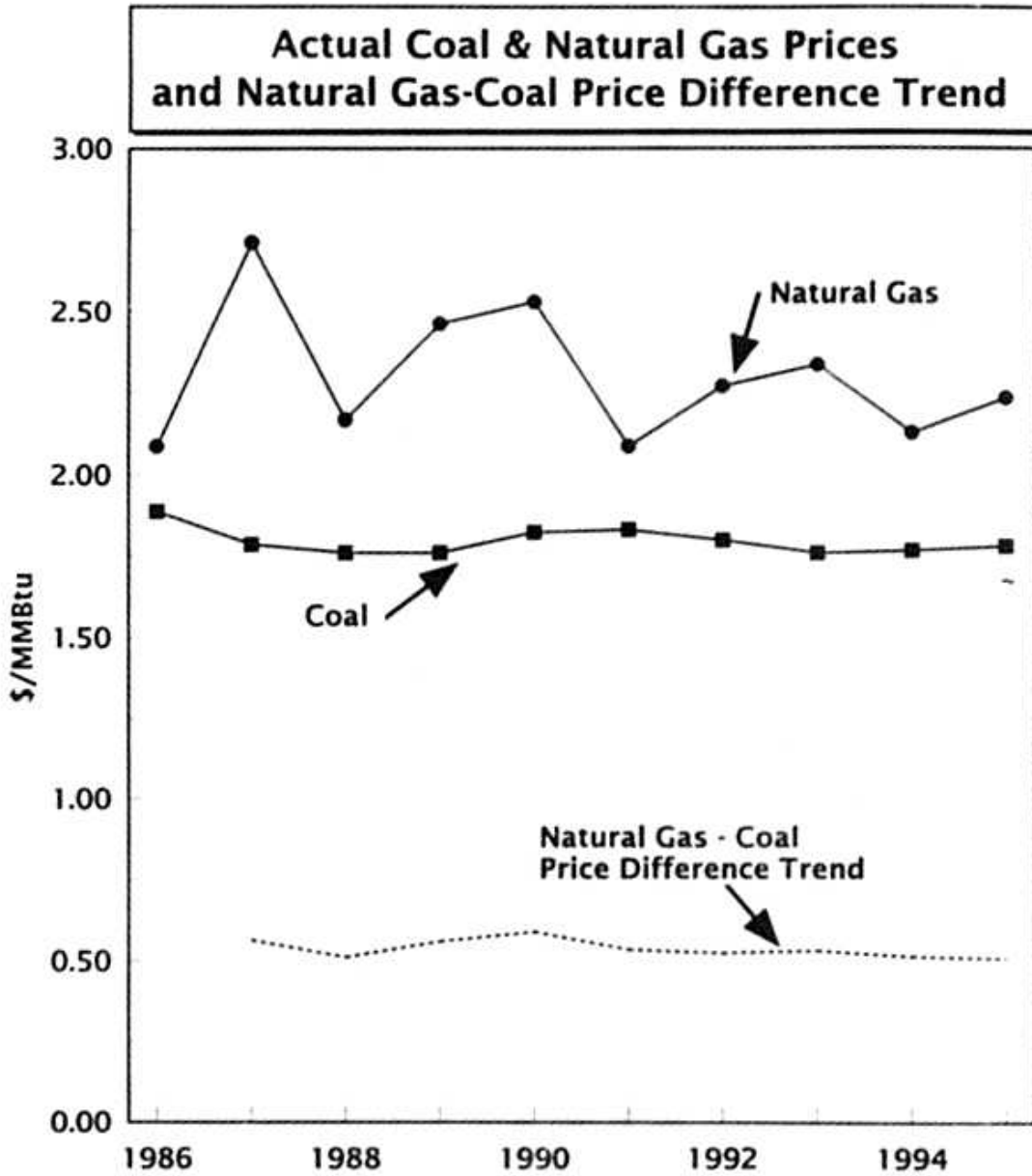
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Sources : Historical Prices are from Ferc F423. Forecasts are from TECO's response to POD 1, Docket 960409-EI.

Actual Prices & TECO's Natural Gas Price Forecasts

	Actual \$/MMBtu	1992 Forecast \$/MMBtu	1993 Fall Forecast \$/MMBtu	1994 Fall Forecast \$/MMBtu	1995 Fall Forecast \$/MMBtu
1986	2.09				
1987	2.71				
1988	2.17				
1989	2.46				
1990	2.53				
1991	2.09				
1992	2.27	2.19			
1993	2.34	2.53	2.94		
1994	2.13	2.88	2.90	2.66	
1995	2.24	3.02	3.19	2.81	2.28
1996		3.28	3.34	3.06	2.45
1997		3.48	3.51	3.29	2.64
1998		3.68	3.69	3.53	2.86
1999		3.90	3.90	3.77	3.03
2000		4.15	4.11	4.01	3.21
2001		4.49	4.35	4.28	3.40
2002		4.79	4.60	4.56	3.59
2003		5.11	4.88	4.88	3.80
2004		5.45	5.19	5.22	4.02
2005		5.83	5.52	5.60	4.27
2006		6.23	5.87	6.00	4.53
2007		6.65	6.25	6.45	4.81
2008		7.12	6.66	6.92	5.11
2009		7.62	7.10	7.45	5.43
2010		8.15	7.57	8.01	5.78
2011		8.82	8.08	8.48	6.15
2012		9.44	8.62	8.97	6.44
2013		10.11	9.20	9.49	6.75
2014		10.84	9.83	10.06	7.08
2015		11.96	10.50	10.66	7.43
2016		12.89	11.23	11.30	7.79



Source : FERC Form 423

**TECO's 1995 Coal & Natural Gas Price Forecasts
and TECO's Coal & Natural Gas Price Differences**

Year	(1)	(2)	(3)=(2)-(1)
	Coal \$/MMBtu	Natural Gas \$/MMBtu	Price Diff. \$/MMBtu
1996	1.42	2.45	1.03
1997	1.45	2.64	1.19
1998	1.48	2.86	1.38
1999	1.51	3.03	1.52
2000	1.55	3.21	1.66
2001	1.59	3.40	1.81
2002	1.63	3.59	1.96
2003	1.67	3.80	2.13
2004	1.71	4.02	2.31
2005	1.75	4.27	2.52
2006	1.79	4.53	2.74
2007	1.83	4.81	2.98
2008	1.88	5.11	3.23
2009	1.92	5.43	3.51
2010	1.97	5.78	3.81
2011	2.02	6.15	4.13
2012	2.06	6.44	4.38
2013	2.11	6.75	4.64
2014	2.16	7.08	4.92
2015	2.21	7.43	5.22
2016	2.27	7.79	5.52
2017	2.32	8.18	5.86
2018	2.38	8.58	6.20
2019	2.44	9.01	6.57
2020	2.50	9.46	6.96

Notes:

The Column(3) widening price difference does not compare to the 1986 - 1994 historic trend of \$0.51 per MMBtu price difference.

Column(1) : TECO's 1995 Fall forecast of Illinois 6 coal prices as reported in Interrogatory No. 5 of Staff's First Set in Docket 950379-EI.

Column(2) : TECO's 1995 Fall base case natural gas price forecast as reported in Interrogatory No. 5 of Staff's First Set in Docket 950379-EI.

Column(3) : Column(2) - Column(1)

**TECO's 1994 Coal & Natural Gas Price Forecasts
and TECO's Coal & Natural Gas Price Differences**

Year	(1)	(2)	(3)=(2)-(1)
	Coal \$/MMBtu	Natural Gas \$/MMBtu	Price Diff. \$/MMBtu
1996	1.49	3.06	1.57
1997	1.53	3.29	1.76
1998	1.57	3.53	1.96
1999	1.62	3.77	2.15
2000	1.67	4.01	2.34
2001	1.73	4.28	2.55
2002	1.79	4.56	2.77
2003	1.86	4.88	3.02
2004	1.92	5.22	3.30
2005	1.99	5.60	3.61
2006	2.07	6.00	3.93
2007	2.14	6.45	4.31
2008	2.22	6.92	4.70
2009	2.30	7.45	5.15
2010	2.39	8.01	5.62
2011	2.47	8.48	6.01
2012	2.56	8.97	6.41
2013	2.65	9.49	6.84
2014	2.75	10.06	7.31
2015	2.85	10.66	7.81
2016	2.96	11.30	8.34
2017	3.07	11.98	8.91
2018	3.20	12.77	9.57
2019	3.33	13.60	10.27
2020	3.48	14.50	11.02

Notes:

The Column(3) widening price difference does not compare to the 1986 - 1993 historic trend of \$0.53 per MMBtu price difference.

Column(1) : TECO's 1994 Fall forecast of Illinois 6 coal prices as reported in Interrogatory No. 5 of Staff's First Set in Docket 950379-EI.

Column(2) : TECO's 1994 Fall base case natural gas price forecast as reported in Interrogatory No. 5 of Staff's First Set in Docket 950379-EI.

Column(3) : Column(2) - Column(1)

**TECO's 1993 Coal & Natural Gas Price Forecasts
and TECO's Coal & Natural Gas Price Differences**

Year	(1)	(2)	(3)=(2)-(1)
	Coal \$/MMBtu	Natural Gas \$/MMBtu	Price Diff. \$/MMBtu
1996	1.56	3.34	1.78
1997	1.89	3.51	1.62
1998	1.66	3.69	2.03
1999	1.71	3.90	2.19
2000	1.77	4.11	2.34
2001	1.83	4.35	2.52
2002	1.90	4.60	2.70
2003	1.97	4.88	2.91
2004	2.05	5.19	3.14
2005	2.13	5.52	3.39
2006	2.22	5.87	3.65
2007	2.32	6.25	3.93
2008	2.42	6.66	4.24
2009	2.53	7.10	4.57
2010	2.65	7.57	4.92
2011	2.78	8.08	5.30
2012	2.92	8.62	5.70
2013	3.06	9.20	6.14
2014	3.22	9.83	6.61
2015	3.36	10.50	7.14
2016	3.51	11.23	7.72
2017	3.68	12.01	8.33
2018	3.86	12.91	9.05
2019	4.05	13.88	9.83
2020	4.26	14.92	10.66

Notes:

The Column(3) widening price difference does not compare to the 1986 - 1992 historic trend of \$0.52 per MMBtu price difference.

Column(1) : TECO's 1993 Fall forecast of Illinois 6 coal prices as reported in Interrogatory No. 5 of Staff's First Set in Docket 950379-EI.

Column(2) : TECO's 1993 Fall base case natural gas price forecast as reported in Interrogatory No. 5 of Staff's First Set in Docket 950379-EI.

Column(3) : Column(2) - Column(1)

**TECO's 1992 Coal & Natural Gas Price Forecasts
and TECO's Coal & Natural Gas Price Differences**

Year	(1)	(2)	(3)=(2)-(1)
	Coal \$/MMBtu	Natural Gas \$/MMBtu	Price Diff. \$/MMBtu
1996	1.71	3.28	1.57
1997	1.78	3.48	1.70
1998	1.86	3.68	1.82
1999	1.94	3.90	1.96
2000	2.03	4.15	2.12
2001	2.13	4.49	2.36
2002	2.24	4.79	2.55
2003	2.36	5.11	2.75
2004	2.49	5.45	2.96
2005	2.63	5.83	3.20
2006	2.77	6.23	3.46
2007	2.93	6.65	3.72
2008	3.10	7.12	4.02
2009	3.28	7.62	4.34
2010	3.47	8.15	4.68
2011	3.67	8.82	5.15
2012	3.90	9.44	5.54
2013	4.14	10.11	5.97
2014	4.40	10.84	6.44
2015	4.72	11.96	7.24
2016	5.07	12.89	7.82
2017	5.44	13.77	8.33
2018	5.85	14.74	8.89
2019	6.31	15.77	9.46
2020	6.80	16.88	10.08

Notes:

The Column(3) widening price difference does not compare to the 1986 - 1991 historic trend of \$0.53 per MMBtu price difference.

- Column(1) : TECO's 1992 Price change coal forecast as reported in Interrogatory No. 5 of Staff's First Set in Docket 950379-EI.
- Column(2) : TECO's 1992 Price Change natural gas price forecast as reported in Interrogatory No. 5 of Staff's First Set in Docket 950379-EI.
- Column(3) : Column(2) - Column(1)