

BEFORE THE RÉGIE DE L'ÉNERGIE

IEc

IN THE MATTER OF:
HYDRO QUÉBEC DISTRIBUTION

Demande d'approbation du Plan
d'approvisionnement 2008-2017 du
Distributeur

DOSSIER R-3648-2007

IEc Undertaking
2 May 2008

prepared on behalf of:

l'Association québécoise des consommateurs
industriels d'électricité (AQCIÉ)

Conseil de l'industrie forestière du Québec (CIFQ)

Undertaking of:

Robert D. Knecht

Industrial Economics, Incorporated

2067 Massachusetts Avenue

Cambridge, MA 02140

UNDERTAKING 1 Please provide the analysis that supports Mr. Knecht’s conclusion at page 5 of his
2 evidence that supports his conclusion that it is “unlikely that new gas-fired capacity
3 could be placed in service at a cost of less than \$80 or \$85 per MWh (in 2008 dollars).
4 Please include supporting information.

RESPONSE 5 In preparing my evidence, I reached this conclusion based on informal calculations
6 using current natural gas prices, as well as parameters from the “Assumptions to the
7 Annual Energy Outlook 2007” (which is attached). To respond to this undertaking, I
8 prepared the attached analysis which is a more formal approach to the issue, with three
9 scenarios.

10 The basis for each of the assumptions in the calculation is as follows:

11 Gas Prices at Henry Hub: The low scenario is based on a simple average of deflated
12 NYMEX gas futures prices for 2013 through 2017. The base scenario uses only the
13 2013 futures prices, and the high scenario is based on near-term gas price
14 expectations. While I recognize that the futures markets are predicting a decline in
15 gas market prices, I note also that even current gas prices are substantially below fuel
16 oil prices on an energy-equivalent basis. This situation is counter to the expectations
17 of some analysts. See, for example, NEB presentation at

18 [http://www.neb.gc.ca/clf-](http://www.neb.gc.ca/clf-nsi/rpblctn/spchsndprsnttn/2007/cndnrgftrfcsntrlgs/cndnrgftrfcsntrlgs-eng.html)
19 [nsi/rpblctn/spchsndprsnttn/2007/cndnrgftrfcsntrlgs/cndnrgftrfcsntrlgs-eng.html](http://www.neb.gc.ca/clf-nsi/rpblctn/spchsndprsnttn/2007/cndnrgftrfcsntrlgs/cndnrgftrfcsntrlgs-eng.html)

20 To derive gas prices in Québec, I looked at differentials between Henry Hub, AECO
21 spot (in Alberta) and Dawn. The current price differential between Henry Hub and
22 AECO spot prices is about \$1.20 per mmbtu (see attached), but the NYMEX futures
23 swaps show a narrowing of the Henry Hub premium to \$0.65 to \$0.70 by 2012 (which
24 is the end of the series). The current Dawn/AECO differential is \$1.60, and this is the
25 value used in the base and high scenarios. While I have not performed a detailed
26 analysis of historical patterns, I note some periods in which the differential is lower.
27 Thus, in the low scenario, I use \$1.20 per mmbtu. Note that reviewing historical
28 differentials between Dawn and Henry Hub produce a similar range of results.

29 Transportation rates Dawn to Québec in the low scenario are based on Union’s M12
30 transportation rate (at 80 percent load factor), including fuel charges. The base and
31 high scenario include a provision for SCGM transport.

32 The EIA assumptions for the low and base scenario are based on a conventional
33 combustion turbine, with established technology. For the high scenario, the EIA
34 assumptions for an advanced combined cycle facility with carbon capture.

35 The capital recovery factor assumptions are detailed in the backup sheets, and are
36 consistent with analysis that I presented to the Régie in 2006. A 15 percent figure,
37 used in the base case, is a typical industry rule-of-thumb. The 80 percent capacity
38 factor for combined cycle facilities is my estimate.

1 This more detailed analysis suggests a relatively wide range of possible prices needed
2 to support a new gas-fired plant in Québec, including the possibility of a prices below
3 \$80 per MWh (in 2008\$). Nevertheless, the base case scenario is reasonably
4 consistent with HQD's replacement cost forecast for the 2013 to 2017 period.

5 Note also that I have not included any provision to reflect the flexibility benefit of the
6 proposed contract modifications with HQP. As I mentioned, that contract provides
7 HQD with significant flexibility about when and how much capacity it will need to
8 take in any year (and even within a year) from HQP. Were an independent generation
9 supplier to provide a product with similar flexibility, it would likely charge a price
10 premium above its costs, to reflect the value of this option that is provided to HQD.

Estimate of Fully Loaded Combined Cycle			
Cost per KWh: @ 2 May 2008			
For 2013 to 2017			
	Low Scenario	Base	High Scenario
Delivered Gas Cost			
Average \$2008 HH Price	\$ 8.06	\$ 8.27	\$ 10.85
AECO Differential	\$ (0.70)	\$ (0.70)	\$ (1.20)
AECO-Dawn Differential	\$ 1.20	\$ 1.60	\$ 1.60
Firm Transport to Quebec	\$ 0.18	\$ 0.30	\$ 0.30
Gas Cost	\$ 8.74	\$ 9.47	\$ 11.55
EIA Parameters for Conv. Gas/Oil CC			
Heat Rate (Btu/kWh)	6,800	6,800	7,493
Overnight Capital Cost \$2005/kW	\$ 603.00	\$ 603.00	\$ 1,185.00
Variable O&M 2005\$/MWh	\$ 1.94	\$ 1.94	\$ 2.77
Fixed O&M 2005 \$/kW	\$ 11.75	\$ 11.75	\$ 18.72
Other Assumptions			
Assumed Capacity Factor	80%	80%	80%
US GNP Deflator 10/04 to 10/07	8.9%	8.9%	8.9%
Capital Recovery Factor	12.4%	15.0%	16.2%
Calculations			
Fixed \$2008 per kW	\$ 94.24	\$ 111.31	\$ 229.48
Fixed \$2008 per MWh	\$ 13.45	\$ 15.88	\$ 32.75
Gas \$2008 per MWh	\$ 59.46	\$ 64.39	\$ 86.54
Fully Loaded CC Cost	\$ 72.90	\$ 80.27	\$ 119.29

**NYMEX US Dollar Henry Hub Futures Prices
Most Recent Settlement Values: 2 May 2008**

<i>Month-Year</i>	<i>Settlement Price</i>	<i>Deflated to Mid- 2008</i>	<i>Month-Year</i>	<i>Settlement Price</i>	<i>Deflated to Mid- 2008</i>
Jan-13	9.869	9.03	Jan-17	9.984	8.44
Feb-13	9.864	9.01	Feb-17	9.979	8.42
Mar-13	9.634	8.78	Mar-17	9.749	8.21
Apr-13	8.674	7.89	Apr-17	8.929	7.51
May-13	8.639	7.85	May-17	8.904	7.47
Jun-13	8.704	7.90	Jun-17	8.964	7.51
Jul-13	8.779	7.95	Jul-17	9.044	7.57
Aug-13	8.829	7.98	Aug-17	9.094	7.60
Sep-13	8.844	7.98	Sep-17	9.109	7.60
Oct-13	8.914	8.03	Oct-17	9.189	7.65
Nov-13	9.179	8.26	Nov-17	9.479	7.88
Dec-13	9.534	8.56	Dec-17	9.879	8.20
Jan-14	9.769	8.76	Jan-18	10.119	8.38
Feb-14	9.764	8.74	Feb-18	10.114	8.36
Mar-14	9.534	8.52	Mar-18	9.884	8.16
Apr-14	8.694	7.76	Apr-18	9.074	7.48
May-14	8.659	7.71	May-18	9.049	7.45
Jun-14	8.719	7.75	Jun-18	9.109	7.48
Jul-14	8.784	7.80	Jul-18	9.189	7.54
Aug-14	8.834	7.83	Aug-18	9.239	7.57
Sep-14	8.844	7.83	Sep-18	9.254	7.57
Oct-14	8.924	7.88	Oct-18	9.334	7.62
Nov-14	9.204	8.12	Nov-18	9.629	7.85
Dec-14	9.584	8.44	Dec-18	10.029	8.16
Jan-15	9.809	8.62	Jan-19	10.264	8.34
Feb-15	9.804	8.60	Feb-19	10.259	8.32
Mar-15	9.574	8.39	Mar-19	10.029	8.12
Apr-15	8.744	7.65	Apr-19	9.229	7.46
May-15	8.719	7.62	May-19	9.209	7.43
Jun-15	8.779	7.65	Jun-19	9.269	7.47
Jul-15	8.854	7.71	Jul-19	9.349	7.52
Aug-15	8.904	7.74	Aug-19	9.399	7.55
Sep-15	8.914	7.73	Sep-19	9.414	7.55
Oct-15	8.994	7.79	Oct-19	9.489	7.59
Nov-15	9.279	8.02	Nov-19	9.779	7.81
Dec-15	9.659	8.34	Dec-19	10.179	8.12
Jan-16	9.889	8.52	Jan-20	10.409	8.29
Feb-16	9.884	8.50	Feb-20	10.404	8.27
Mar-16	9.654	8.29	Mar-20	10.174	8.07
Apr-16	8.824	7.57	Apr-20	9.374	7.43
May-16	8.799	7.53	May-20	9.354	7.40
Jun-16	8.859	7.57	Jun-20	9.414	7.43
Jul-16	8.934	7.62	Jul-20	9.494	7.48
Aug-16	8.984	7.65	Aug-20	9.544	7.51
Sep-16	8.994	7.65	Sep-20	9.564	7.51
Oct-16	9.069	7.70	Oct-20	9.654	7.57
Nov-16	9.359	7.93	Nov-20	9.954	7.80
Dec-16	9.749	8.25	Dec-20	10.354	8.10

Capital Recovery Factor (Inflation-Adjusted)

	0	1	2	3	4	5	6	7	8	9	10	15	20
Nominal Debt Rate		6.3%											
Nominal AT Equity Rate		12.0%											
Tax Rate		40.0%											
Inflation Rate		2.0%											
Debt Share				50%									
Investment	(1.00)												
YE Book Value	1.00	0.90	0.81	0.73	0.66	0.59	0.53	0.48	0.43	0.39	0.35	0.17	-
Dep'n (DDB-20)	1.00000	0.10	0.09	0.08	0.07	0.07	0.06	0.05	0.05	0.04	0.04	0.03	0.03
Debt Balance	0.50	0.45	0.41	0.36	0.33	0.30	0.27	0.24	0.22	0.19	0.17	0.09	-
Equity Balance	0.50	0.45	0.41	0.36	0.33	0.30	0.27	0.24	0.22	0.19	0.17	0.09	-
Revenue		0.12	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.15	0.15	0.16	0.18
Dep'n		(0.10)	(0.09)	(0.08)	(0.07)	(0.07)	(0.06)	(0.05)	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)
Debt Cost		(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.00)
Book Income		(0.01)	0.01	0.02	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.12	0.15
Taxes		0.00	(0.00)	(0.01)	(0.01)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)	(0.06)
Net Income		(0.00)	0.01	0.01	0.02	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.09
Depreciation		0.10	0.09	0.08	0.07	0.07	0.06	0.05	0.05	0.04	0.04	0.03	0.03
Debt Cash Flow	(\$0.50)	(0.05)	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Net Cash Flow	\$0.50	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.09	0.10
Capital Recovery Factor ==>		12.4%											

Note columns hidden

Capital Recovery Factor (Inflation-Adjusted)

AA Utility Bond Rate	6.0%	Debt Share	50%
EIA Premium	1.3%		
Debt Rate	7.3%		
Beta	140.0%		
Rf	4.9%		
Market Premium	8.5%		
Nominal AT Equity Rate	16.8%		
Tax Rate	38.0%		
Inflation Rate	2.0%		

	0	1	2	3	4	5	6	7	8	9	10	15	20
Investment	(1.00)												
YE Book Value	1.00	0.90	0.81	0.73	0.66	0.59	0.53	0.48	0.43	0.39	0.35	0.17	-
Dep'n (DDB-20)	1.00000	0.10	0.09	0.08	0.07	0.07	0.06	0.05	0.05	0.04	0.04	0.03	0.03
Debt Balance	0.50	0.45	0.41	0.36	0.33	0.30	0.27	0.24	0.22	0.19	0.17	0.09	-
Equity Balance	0.50	0.45	0.41	0.36	0.33	0.30	0.27	0.24	0.22	0.19	0.17	0.09	-
Revenue		0.16	0.16	0.17	0.17	0.17	0.18	0.18	0.18	0.19	0.19	0.21	0.23
Dep'n		(0.10)	(0.09)	(0.08)	(0.07)	(0.07)	(0.06)	(0.05)	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)
Debt Cost		(0.04)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.00)
Book Income		0.02	0.04	0.06	0.07	0.08	0.10	0.11	0.12	0.13	0.14	0.17	0.20
Taxes		(0.01)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.06)	(0.08)
Net Income		0.02	0.03	0.04	0.04	0.05	0.06	0.07	0.07	0.08	0.09	0.11	0.12
Depreciation		0.10	0.09	0.08	0.07	0.07	0.06	0.05	0.05	0.04	0.04	0.03	0.03
Debt Cash Flow	(\$0.54)	(0.05)	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Net Cash Flow	\$0.50	0.07	0.07	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.11	0.12	0.14
Capital Recovery Factor ==>		16.1%											

Note columns hidden.

Title: Gross National Product: Implicit Price Deflator
 Series ID: GNPDEF
 Source: U.S. Department of Commerce: Bureau of Economic Analysis
 Release: Gross Domestic Product
 Seasonal Adjustment: Seasonally Adjusted
 Frequency: Quarterly
 Units: Index 2000=100
 Date Range: 2004-01-01 to 2007-10-01
 Last Updated: 2008-03-27 11:16 AM CDT
 Notes: The number of decimal places reported varies over time. A Guide to the National Income and Product Accounts of the United States (NIPA) - (<http://www.bea.gov/bea/an/nipaguid.pdf>)

DATE	VALUE	
2004-01-01	108.170	
2004-04-01	109.173	
2004-07-01	109.786	
2004-10-01	110.666	
2005-01-01	111.717	
2005-04-01	112.442	
2005-07-01	113.403	
2005-10-01	114.384	
2006-01-01	115.350	
2006-04-01	116.338	
2006-07-01	117.019	
2006-10-01	117.511	
2007-01-01	118.736	
2007-04-01	119.512	
2007-07-01	119.814	
2007-10-01	120.535	8.92%

- U.S. stocks increased on the day as a rebound in the U.S. dollar and dipping oil prices calmed inflation fears, renewing interest in stocks. Financial stocks led the way a day after the Federal Reserve lowered interest rates again, with shares of American Express increasing 6.9%. In the Tech sector, shares of Apple increased 3.5% as the Company announced it will sell movies on iTunes the same day DVDs are out. The Dow Jones Industrial Average increased 189.87 points to end at 13,010.00, while the NASDAQ increased 67.91 points to close at 2,480.71.
- Canadian stocks finished higher largely due to a strong day for financials. Shares of CIBC increased 3.5% and TD Bank rose 3.0%. In the Tech sector, Research in Motion was up 6.6% on rumours that the Company is developing a new flip phone. On the downside, Energy companies Encana and Suncor both closed down 2.7% on the day. The S&P/TSX Composite Index closed at 14,065.81, up 128.77 points.
- Canadian natural gas prices fell for the third straight day on higher than expected North American storage levels and a drop in crude prices. Canadian inventories rose 9% to 175.9 Bcf. Storage facilities in Canada are now 27% full, as compared to 47% full in the same period a year ago. Temperatures in the U.S. Midwest are expected to be cooler than normal, but not cool enough to generate much heating demand. The AECO natural gas spot price decreased \$0.07 to close at \$9.71 per Mcf.
- U.S. natural gas prices ended lower after U.S. inventories were reportedly higher than expected. Stockpiles for last week increased 86 Bcf to 1.37 Tcf, which was higher than median expectations of 70 Bcf. NYMEX natural gas for June delivery finished down \$0.282 to close at \$10.561 per Mmbtu.
- Crude prices ended lower on Thursday on pressure from the strengthening U.S. dollar and easing supply worries in Nigeria. The U.S. dollar hit a five-week high against the Euro. Prices bounced back later in the trading session, as technical traders cited the \$110 area as a major support level as the main catalyst. NYMEX crude for June delivery decreased \$0.94 to close at \$112.52 per barrel.

MARKET NEWS

May 2, 2008

	May. 1 Close	Change
Dow Jones Industrial Average	13,010.00	+189.87
NASDAQ	2,480.71	+67.91
S&P 500	1,409.34	+23.75
Amex Oil Index	1,469.71	-15.04
S&P/TSX Composite Index	14,065.81	+128.77
S&P/TSX Cdn. Energy Index	389.59	-4.83
S&P/TSX Oil & Gas Producers	4,021.52	-39.59
S&P/TSX Oil & Gas Services	1,971.72	-6.62
S&P/TSX Energy Trusts	191.55	-1.66
Can-US Exchange Rate (US ¢)	98.15	-0.91
10Yr Gov't Canada Bond	3.57%	-0.02

COMMODITY NEWS

Natural Gas	(\$C/Mcf)	May. 1 Close	Change
Aeco Spot (NGX)		\$9.71	-7¢
Differential (H. Hub/Aeco)		\$1.17	+2¢
Aeco Near Month-Jun 08 (NGX)		\$9.62	-16¢
Aeco 12 Month Strip (NGX)		\$9.91	-11¢
Aeco Calendar Strip 2009 (NGX)		\$9.30	-3¢
Kingsgate		\$10.11	-11¢
Dawn		\$11.32	-7¢
Henry Hub Spot	(\$US/Mmbtu)	\$10.68	-15¢
NYMEX Jun08		\$10.561	-28.2¢
NYMEX 12 Month Strip		\$10.861	-21.3¢
NYMEX 2009 Strip		\$10.202	-13.4¢
UK NBP (Day Ahead)		\$11.60	-87¢
Netherlands TTF (Day Ahead)		\$10.87	-65¢
Zeebrugge (Day Ahead)		\$11.81	+4¢
Crude Oil			
Edmonton Light		\$121.13	-\$1.56
Bow River Stream		\$96.84	-\$4.18
Differential (Ed Light/Bow)		\$24.29	+\$2.62
Differential (WT/Edm Light)		-\$6.49	+\$1.66
WTI Cushing Spot	(\$US/Bbl)	\$112.52	-94¢
NYMEX Jun08		\$112.52	-94¢
NYMEX 12 Month Strip		\$109.52	-68¢
NYMEX 2009 Strip		\$106.73	-55¢
Brent (ICE) Jun08		\$110.50	-86¢
OPEC Basket (As of Apr. 29)		\$109.86	-\$1.80
Electricity	(\$C/MWh)	Apr. 30 Close	
Alberta Power Pool (Peak) ¹		\$95.73	+\$4.90
Alberta Power Pool (24 Hr.)		\$72.18	-\$1.78
Ontario Power Market (Peak) ¹		\$66.04	+\$5.87
Ontario Power Market (24 Hr.)		\$55.80	+\$7.73

pears will be the shut down of production operations in the North Sea, possibly impacting as much as 700 thousand B/d of production for a few days.

U.S. Gas Storage BCF	Current Apr-25-08	Change Bcf	Change Bcf/d	Last Year Apr-26-07	3-Year Average	5-Year Average
Producing Region	531	25	3.6	668	638	521
Consuming East	652	54	7.7	709	767	639
Consuming West	188	7	1.0	262	246	219
U.S. Total	1,371	86	12.3	1,639	1,651	1,379

Source: United States Energy Information Administration

While the information contained in this document was obtained from sources believed to be reliable, FirstEnergy Capital Corp. does not guarantee its accuracy and completeness. Sources include Bloomberg, Canadian Association of Oilwell Drilling Contractors, Alberta Electric System Operator and the Ontario Independent Electricity System Operator. (1) In order to accurately reflect correct averages for the Alberta and Ontario power markets, prices shown are for the date prior to the above close date; peak prices comprise the period spanning 6:00 a.m. local time to 10:00 p.m. local time for the date shown; prices for 24 Hr. comprise all prices in the 24 hour period for the date shown.

- U.S. stocks ended higher on Wednesday as technology companies posted strong results. Shares of Broadcom Corp., and Apple were up 16.3% and 1.7% respectively. Shares of Boeing gained 4.5% after news that strong deliveries of commercial planes boosted its profits. The Dow Jones Industrial Average added 42.99 points to 12,763.22, while the NASDAQ closed at 2,405.21, up 28.27 points.
- Canadian stocks fell as gold-mining and energy stocks pulled the Index down. Overall the gold subindex was down 3.5%, as falling bullion prices were pressured by the U.S. dollar's rise. Furthermore, the oil and gas sector gave up 1.8% as investors took profits following the recent advances in crude prices. Shares of Suncor Energy Inc. were down 4.2%, leading the decline in the group. The S&P/TSX Composite Index fell 196.54 points to close at 14,069.80, with seven of its 10 main sectors declining on the day.
- Canadian natural gas prices fell, despite a gain in futures, as temperatures in Western Canada were forecast to warm up. The unseasonably cold weather in Alberta, which has lasted for almost a week, is expected to end by Saturday as temperatures return to normal for the weekend. In Toronto, daytime highs will be warmer than usual through Saturday. The AECO Spot closed down \$0.07 to \$9.76 per Mcf.
- U.S. natural gas prices ended higher backed by a continued run up in crude and technical buying despite milder weather forecasts. Temperatures in the U.S. Northeast and Midwest are expected to be above average for the duration of the week. NYMEX gas for May delivery gained \$0.174 to \$10.781 per Mmbtu.
- Oil prices continued to rise after U.S. government data showed a larger than anticipated decline in gasoline stocks ahead of summer driving season, which offset a build in crude inventories. Crude stocks rose last week by 2.42 million barrels when the median expectations were for a build of 1.5 million barrels. Gasoline stocks fell last week by 3.18 million barrels when the median expectations were for a draw of 2.1 million barrels. NYMEX crude for June delivery gained \$0.23 to close at \$118.30 per barrel.

MARKET NEWS

April 24, 2008

	Apr. 23 Close	Change
Dow Jones Industrial Average	12,763.22	+42.99
NASDAQ	2,405.21	+28.27
S&P 500	1,379.93	+3.99
Amex Oil Index	1,502.58	-11.93
S&P/TSX Composite Index	14,069.80	-196.54
S&P/TSX Cdn. Energy Index	403.83	-7.48
S&P/TSX Oil & Gas Producers	4,180.28	-49.31
S&P/TSX Oil & Gas Services	1,976.07	-75.85
S&P/TSX Energy Trusts	199.05	-3.12
Can-US Exchange Rate (US ¢)	98.09	-1.58
10Yr Gov't Canada Bond	3.67%	+0.02

COMMODITY NEWS

Natural Gas	(\$C/Mcf)	Apr. 23 Close	Change
Aeco Spot (NGX)		\$9.76	-7¢
Differential (H. Hub/Aeco)		\$0.77	+1¢
Aeco Near Month-May 08 (NGX)		\$9.98	+28¢
Aeco 12 Month Strip (NGX)		\$10.42	+30¢
Aeco Calendar Strip 2009 (NGX)		\$9.72	+28¢
Kingsgate		\$9.98	-7¢
Dawn		\$11.07	-8¢
	(\$US/Mmbtu)		
Henry Hub Spot		\$10.33	-23¢
NYMEX May08		\$10.781	+17.4¢
NYMEX 12 Month Strip		\$11.304	-2.7¢
NYMEX 2009 Strip		\$10.576	+14.8¢
UK NBP (Day Ahead)		\$12.83	+25¢
Netherlands TTF (Day Ahead)		\$12.58	+22¢
Zeebrugge (Day Ahead)		\$12.51	+2¢
Crude Oil			
Edmonton Light		\$122.40	+86¢
Bow River Stream		\$101.18	+\$1.43
Differential (Ed Light/Bow)		\$21.22	-57¢
Differential (WTI/Edm Light)		-\$0.67	+\$1.11
	(\$US/Bbl)		
WTI Cushing Spot		\$119.40	+3¢
NYMEX Jun08		\$118.30	+23¢
NYMEX 12 Month Strip		\$115.02	+28¢
NYMEX 2009 Strip		\$111.94	+56¢
Brent (ICE) Jun08		\$116.46	+51¢
OPEC Basket (As of Apr. 22)		\$109.92	+99¢
Electricity	(\$C/MWh)	Apr. 22 Close	
Alberta Power Pool (Peak) ¹		\$173.18	+\$53.40
Alberta Power Pool (24 Hr.)		\$178.07	+\$66.97
Ontario Power Market (Peak) ¹		\$61.15	-\$21.40
Ontario Power Market (24 Hr.)		\$45.51	-\$12.62

U.S. Dept. of Energy Energy Information Admin.		Current	Last Week	1 Year Ago	% Change From	
		Apr 18, 2008	Apr 11, 2008	Apr 20, 2007	Last Week	Last Year
Inventories (MM Bbls)	Crude Oil	316.08	313.66	334.48	0.8%	-5.5%
	Gasoline	212.57	215.75	194.21	-1.5%	9.5%
	Distillates	104.70	106.08	117.33	-1.3%	-10.8%
Production (MM B/d)	Crude Oil	5.10	5.10	5.13	0.1%	-0.5%
	Gasoline	8.87	8.84	8.54	0.3%	3.9%
	Distillates	4.12	4.03	4.12	2.2%	0.0%
Imports (MM B/d)	Crude Oil	10.04	8.88	10.04	13.1%	0.1%
	Oil Products	3.62	3.15	3.68	14.9%	-1.6%
Refining	Utilization	85.6%	81.4%	87.8%	4.2%	-2.2%

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- U.S. stocks posted strong gains Friday on better than expected results from several industry bellwethers. Google shares rose 20% after posting strong results and showing no signs of a slowdown in online advertising. Heavy equipment manufacturer Caterpillar also posted strong results, with the stock gaining 8.5% on the day. Meanwhile, Citigroup's shares gained 4.5% as its quarterly loss was not as large as expected. All ten sectors of the S&P 500 were positive on the day, with Information Technology and Industrials sectors the highest gainers, up 3.4% and 2.7% respectively. On the whole, the S&P 500 Index gained 24.77 points (+1.8%) to close at 1,390.33 while the NASDAQ Composite Index gained 61.14 points (+2.6%) to finish at 2,402.97.

- The Canadian stock market was also up Friday. The Financials and Tech sectors were both strong, piggybacking on positive market sentiment from south of the border. The heavyweight Materials sector was down 0.8%, holding back the overall index, as falling gold prices pulled the Gold subsector down 3.4%. Notable stock moves included Research In Motion gaining 3.1%, and Potash Corp. shares gaining another 4.5%. Overall the S&P/TSX Composite Index gained 121.56 points (+0.9%) to end at 14,237.06.

- Canadian spot natural gas prices were little changed, despite gains in NYMEX futures south of the border. AECO natural gas spot prices were up \$0.02 to \$9.53 per Mcf.

- U.S. natural gas prices rose Friday to their highest levels in over two year. Strong crude prices, and the continued outage of the Independence Hub offshore Gulf of Mexico, are provided price support, even though the market is in its spring shoulder season in terms of demand. NYMEX natural gas for May delivery gained \$0.204 to end at \$10.587 per Mmbtu.

- Crude oil prices continued to hit record highs Friday as bullish sentiment continues to drive prices. Despite relatively little in terms of fundamental news, the price of NYMEX WTI for May delivery gained another \$1.83 to close at \$116.69 per barrel.

MARKET NEWS April 21, 2008

	Apr. 18 Close	Change
Dow Jones Industrial Average	12,849.36	+228.87
NASDAQ	2,402.97	+61.14
S&P 500	1,390.33	+24.77
Amex Oil Index	1,488.48	+15.33
S&P/TSX Composite Index	14,237.06	+121.56
S&P/TSX Cdn. Energy Index	402.70	+2.83
S&P/TSX Oil & Gas Producers	4,156.99	+38.52
S&P/TSX Oil & Gas Services	2,024.86	+18.56
S&P/TSX Energy Trusts	196.22	+0.36
Can-US Exchange Rate (US ¢)	99.17	+0.28
10Yr Gov't Canada Bond	3.69%	+0.01

COMMODITY NEWS

Natural Gas	(\$C/Mcf)	Apr. 18 Close	Change
Aeco Spot (NGX)		\$9.53	+2¢
Differential (H. Hub/Aeco)		\$0.63	-24¢
Aeco Near Month-May 08 (NGX)		\$9.68	+12¢
Aeco 12 Month Strip (NGX)		\$10.04	+11¢
Aeco Calendar Strip 2009 (NGX)		\$9.32	+11¢
Kingsgate		\$9.69	+12¢
Dawn		\$10.76	-12¢
Henry Hub Spot	(\$US/Mmbtu)	\$10.07	-19¢
NYMEX May08		\$10.587	+20.4¢
NYMEX 12 Month Strip		\$11.061	+23.6¢
NYMEX 2009 Strip		\$10.257	+20.1¢
UK NBP (Day Ahead)		\$12.10	-37¢
Netherlands TTF (Day Ahead)		\$11.67	-23¢
Zeebrugge (Day Ahead)		\$11.93	-54¢

Crude Oil			
Edmonton Light		\$119.36	+16¢
Bow River Stream		\$97.69	+32¢
Differential (Ed Light/Bow)		\$21.67	-15¢
Differential (WTI/Edm Light)		-\$1.69	+\$1.35
WTI Cushing Spot	(\$US/Bbl)	\$116.69	+\$1.83
NYMEX May08		\$116.69	+\$1.83
NYMEX 12 Month Strip		\$112.99	+\$1.19
NYMEX 2009 Strip		\$109.47	+\$1.30
Brent (ICE) Jun08		\$113.92	+\$1.49
OPEC Basket (As of Apr. 17)		\$107.63	+98¢

Electricity	(\$C/MWh)	Apr. 17 Close	
Alberta Power Pool (Peak) ¹		\$134.89	+\$52.02
Alberta Power Pool (24 Hr.)		\$104.69	+\$30.04
Ontario Power Market (Peak) ¹		\$47.90	-\$1.96
Ontario Power Market (24 Hr.)		\$40.94	-\$3.52

	Units	Apr-11-08	Apr-4-08	Wkly Chg	Q4 2007	2008 YTD	2007 YTD	'08/'07 Chg
Exchange Rate	US¢/Cdn\$	98.25	98.50	-0.3%	101.98	99.41	85.56	16.2%
Aeco Spot	\$Cdn/Mcf	\$9.09	\$8.97	1.3%	\$6.17	\$8.02	\$7.45	7.6%
Henry Hub	\$US/Mmbtu	\$9.88	\$9.68	2.0%	\$6.97	\$8.76	\$7.23	21.0%
Henry Hub/Aeco Diff.	\$Cdn/Mcf	\$0.97	\$0.86	12.6%	\$0.67	\$0.79	\$1.00	-21.1%
Edmonton Light	\$Cdn/Bbl	\$115.69	\$109.82	5.3%	\$87.12	\$99.79	\$68.31	46.1%
Bow River Stream	\$Cdn/Bbl	\$94.35	\$94.65	-0.3%	\$56.91	\$79.63	\$50.44	57.9%
Edm Lt/Bow River Diff.	\$Cdn/Bbl	\$21.34	\$15.17	40.6%	\$30.21	\$20.16	\$17.88	12.7%
Edmonton Light	\$US/Bbl	\$113.66	\$108.16	5.1%	\$88.89	\$99.17	\$58.46	69.6%
WTI Spot	\$US/Bbl	\$109.74	\$103.49	6.0%	\$90.77	\$98.91	\$58.86	68.0%
Edm Light/WTI Diff	\$US/Bbl	\$3.92	\$4.67	-16.1%	(\$2.06)	\$0.39	(\$0.44)	-188.3%

Source: Bloomberg, Company Crude Oil Postings.

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Assumptions to the Annual Energy Outlook 2007

Table 38. Generating Capacity Types Represented in the Electricity Market Module

Capacity Type
Existing coal steam plants ¹
High Sulfur Pulverized Coal with Wet Flue Gas Desulfurization
Advanced Coal - Integrated Coal Gasification Combined Cycle
Advanced Coal with carbon sequestration
Oil/Gas Steam - Oil/Gas Steam Turbine
Combined Cycle - Conventional Gas/Oil Combined Cycle Combustion Turbine
Advanced Combined Cycle - Advanced Gas/Oil Combined Cycle Combustion Turbine
Advanced Combined Cycle with carbon sequestration
Combustion Turbine - Conventional Combustion Turbine
Advanced Combustion Turbine - Steam Injected Gas Turbine
Molten Carbonate Fuel Cell
Conventional Nuclear
Advanced Nuclear - Advanced Light Water Reactor
Generic Distributed Generation - Baseload
Generic Distributed Generation - Peak
Conventional Hydropower - Hydraulic Turbine
Pumped Storage - Hydraulic Turbine Reversible
Geothermal
Municipal Solid Waste
Biomass - Integrated Gasification Combined-Cycle
Solar Thermal - Central Receiver
Solar Photovoltaic - Single Axis Flat Plate
Wind

¹The EMM represents 32 different types of existing coal steam plants, based on the different possible configuration of NO_x, particulate and SO₂ emission control devices, as well as future options for controlling mercury.

Source: Energy Information Administration, Office of Integrated Analysis and Forecasting.

Table 39. Cost and Performance Characteristics of New Central Station Electricity Generating Technologies

Technology	Online Year ¹	Size (mW)	Leadtimes (Years)	Base Overnight Costs in 2006 (\$2005/kW)	Contingency Factors		Total Overnight Cost in 2006 ² (2005 \$/kW)	Variable O&M ⁴ (\$2005/mWh)	Fixed O&M ⁴ (\$2005/kW)	Heatrate in 2006 (Btu/kWh)	Heatrate nth-of-a-kind (Btu/kWh)
					Project Contingency Factor	Technological Optimism Factor ³					
Scrubbed Coal New	2010	600	4	1,206	1.07	1.00	1,290	4.32	25.91	8,644	8,600
Integrated Coal-Gasification Combined Cycle (IGCC) ⁵	2010	550	4	1,394	1.07	1.00	1,491	2.75	36.38	8,309	7,200
IGCC with Carbon Sequestration	2010	380	4	1,936	1.07	1.03	2,134	4.18	42.82	9,713	7,020
Conv Gas/Oil Comb Cycle	2009	250	3	574	1.05	1.00	603	1.94	11.75	7,163	6,800
Adv Gas/Oil Comb Cycle (CC)	2009	400	3	550	1.08	1.00	594	1.88	11.01	6,717	6,333
ADV CC with Carbon Sequestration	2010	400	3	1,055	1.08	1.04	1,185	2.77	18.72	6,547	7,493
Conv Combustion Turbine ⁶	2008	160	2	400	1.05	1.00	420	3.36	11.40	10,807	10,450
Adv Combustion Turbine	2008	230	2	379	1.05	1.00	398	2.98	9.91	9,166	8,550
Fuel Cells	2009	10	3	3,913	1.05	1.10	4,520	45.09	5.32	7,873	6,960
Advanced Nuclear	2014	1350	6	1,802	1.10	1.05	2,081	0.47	63.88	10,400	10,400
Distributed Generation -Base	2009	2	3	818	1.05	1.00	859	6.70	15.08	9,500	8,900
Distributed Generation -Peak	2008	1	2	983	1.00	1.00	1,032	6.70	15.08	10,634	9,880
Biomass	2010	80	4	1,714	1.07	1.02	1,869	2.95	50.18	8,911	8,911
MSW - Landfill Gas	2009	30	3	1,491	1.07	1.00	1,595	0.01	107.50	13,648	13,648
Geothermal ^{6,7}	2010	50	4	1,790	1.05	1.00	1,880	0.00	154.82	35,025	30,641
Conventional Hydropower ⁶	2010	500	4	1,364	1.10	1.00	1,500	3.30	13.14	10,107	10,107
Wind	2009	50	3	1,127	1.07	1.00	1,206	0.00	28.51	10,280	10,280
Solar Thermal ⁷	2009	100	3	2,675	1.07	1.10	3,149	0.00	53.43	10,280	10,280
Photovoltaic ⁷	2008	5	2	4,114	1.05	1.10	4,751	0.00	10.98	10,280	10,280

¹Online year represents the first year that a new unit could be completed, given an order date of 2006.

²The technological optimism factor is applied to the first four units of a new, unproven design, or regulatory structure. It reflects the demonstrated tendency to underestimate actual costs for a first-of-a-kind unit.

³Overnight capital cost including contingency factors, excluding regional multipliers and learning effects. Interest charges are also excluded. These represent costs of new projects initiated in 2006.

⁴O&M = Operations and maintenance.

⁵Combustion turbine units can be built by the model prior to 2008 if necessary to meet a given region's reserve margin.

⁶Because geothermal and hydro cost and performance characteristics are specific for each site, the table entries represent the cost of the least expensive plant that could be built in the Northwest Power Pool region, where most of the proposed sites are located.

⁷Capital costs are shown before investment tax credits are applied.

Sources: The values shown in this table are developed by the Energy Information Administration, Office of Integrated Analysis and Forecasting, from analysis of reports and discussions with various sources from industry, government, and the Department of Energy Fuel Offices and National Laboratories. They are not based on any specific technology model, but rather, are meant to represent the cost and performance of typical plants under normal operating conditions for each plant type. Key sources reviewed are listed in the 'Notes and Sources' section at the end of the chapter.

Table 40. Learning Parameters for New Generating Technology Components

Technology Component	Period 1 Learning Rate	Period 2 Learning Rate	Period 3 Learning Rate	Period 1 Doublings	Period 2 Doublings	Minimum Total Learning by 2025
Pulverized Coal	-	-	1%	-	-	5%
Combustion Turbine - conventional	-	-	1%	-	-	5%
Combustion Turbine - advanced	-	10%	1%	-	5	10%
HRSG ¹	-	-	1%	-	-	5%
Gasifier	-	10%	1%	-	5	10%
Carbon Capture/Sequestration	20%	10%	1%	3	5	20%
Balance of Plant - IGCC	-	-	1%	-	-	5%
Balance of Plant - Turbine	-	-	1%	-	-	5%
Balance of Plant - Combined Cycle	-	-	1%	-	-	5%
Fuel Cell	10%	5%	1%	3	5	10%
Advanced Nuclear	5%	3%	1%	3	5	10%
Fuel prep - Biomass IGCC	20%	10%	1%	3	5	20%
Distributed Generation - Base	-	5%	1%	-	5	10%
Distributed Generation - Peak	-	5%	1%	-	5	10%
Geothermal	-	8%	1%	-	5	10%
Municipal Solid Waste	-	-	1%	-	-	5%
Hydropower	-	-	1%	-	-	5%
Wind	-	-	1%	-	-	1%
Solar Thermal	20%	10%	1%	3	5	20%
Solar PV	15%	8%	1%	3	5	20%

¹HRSG = Heat Recovery Steam Generator

Note: Please see the text for a description of the methodology for learning in the Electricity Market Module.

Source: Energy Information Administration, Office of Integrated Analysis and Forecasting.

Table 41. Component Cost Weights for New Technologies

Technology	Combustion Turbine-conventional	Combustion Turbine-advanced	HRSG	Gasifier	Carbon Capture/Sequestration	Balance of Plant-IGCC	Balance of Plant-Turbine	Balance of Plant-Combined Cycle	Fuelprep Biomass IGCC
Integrated Coal_Gasification Comb Cycle (IGCC)	0%	15%	20%	41%	0%	24%	0%	0%	0%
IGCC with carbon sequestration	0%	10%	15%	30%	30%	15%	0%	0%	0%
Conv Gas/Oil Comb Cycle	30%	0%	40%	0%	0%	0%	0%	30%	0%
Adv Gas/Oil Comb Cycle (CC)	0%	30%	40%	0%	0%	0%	0%	30%	0%
Adv CC with carbon sequestration	0%	20%	25%	0%	40%	0%	0%	15%	0%
Conv Comb Turbine	50%	0%	0%	0%	0%	0%	50%	0%	0%
Adv Comb Turbine	0%	50%	0%	0%	0%	0%	50%	0%	0%
Biomass	0%	12%	16%	33%	0%	20%	0%	0%	19%

Note: All unlisted technologies have a 100% weight with the corresponding component. Components are not broken out for all technologies unless there is overlap with other technologies.

HRSG = Heat Recovery Steam Generator.

Source: Market Based Advanced Coal Power Systems, May 1999, DOE/FE-0400

Table 42. Component Capacity Weights for New Technologies

Technology	Combustion Turbine-conventional	Combustion Turbine-advanced	HRSG	Gasifier	Carbon Capture/Sequestration	Balance of Plant-IGCC	Balance of Plant-Turbine	Balance of Plant-Combined Cycle	Fuelprep Biomass IGCC
Integrated Coal Gasification Comb Cycle (IGCC)	0%	67%	33%	100%	0%	100%	0%	0%	0%
IGCC with carbon sequestration	0%	67%	33%	100%	100%	100%	0%	0%	0%
Conv Gas/Oil Comb Cycle	67%	0%	33%	0%	0%	0%	0%	100%	0%
Adv Gas/Oil Comb Cycle (CC)	0%	67%	33%	0%	0%	0%	0%	100%	0%
Adv CC with carbon sequestration	0%	67%	33%	0%	100%	0%	0%	100%	0%
Conv Comb Turbine	100%	0%	0%	0%	0%	0%	100%	0%	0%
Adv Comb Turbine	0%	100%	0%	0%	0%	0%	100%	0%	0%
Biomass	0%	67%	33%	100%	0%	100%	0%	0%	100%

HRSG = Heat Recovery Steam Generator.

Source: Energy Information Administration, Office of Integrated Analysis and Forecasting.

Table 43. Nuclear Uprates by EMM Region (gigawatts)

Region	
East Central Area Reliability Coordination Agreement	0.1
Electric Reliability Council of Texas	0.4
Mid-Atlantic Area Council	0.1
Mid-America Interconnected Network	0.1
Mid-Continent Area Power Pool	0.0
New York	0.1
New England	0.1
Florida Reliability Coordinating Council	0.1
Southeastern Electric Reliability Council	1.8
Southwest Power Pool	0.0
Northwest Power Pool	0.0
Rocky Mountain Power Area, Arizona, New Mexico, and Southern Nevada	0.2
California	0.0
Total	2.7

Source: Energy Information Administration, Office of Integrated Analysis and Forecasting, based on Nuclear Regulatory Commission survey, <http://www.nrc.gov/reactors/operating/licensing/power-uprates.html>

Table 44. Summer Season NO_x Emissions Budgets for 2004 and Beyond
(Thousand tons per season)

State	Emissions Cap
Alabama	29.02
Connecticut	2.65
Delaware	5.25
District of Columbia	0.21
Illinois	32.37
Indiana	47.73
Kentucky	36.50
Maryland	14.66
Massachusetts	15.15
Michigan	32.23
New Jersey	10.25
New York	31.04
North Carolina	31.82
Ohio	48.99
Pennsylvania	47.47
Rhode Island	1.00
South Carolina	16.77
Tennessee	25.81
Virginia	17.19
West Virginia	26.86

Source: U.S. Environmental Protection Agency, Federal Register, Vol. 65, number 42 (March 2, 2002) pages 11222-11231.

Table 45. Coal Plant Retrofit Costs
(2005 Dollars)

Coal Plant Size (MW)	FGD Capital Costs (\$/KW)	SCR Capital Costs (\$/KW)
300	291	120
500	223	105
700	184	95

Note: The model was run for each individual plant assuming a 1.3 retrofit factor for FGDs and 1.6 factor for SCRs.

Source: CUECOST3.xls model (as updated 2/9/2000) developed for the Environmental Protection Agency by Raytheon Engineers and Constructors, Inc. EPA Contract number 68-D7-0001.

Table 46. Mercury Emission Modification Factors

Configuration			EIA EMFs			EPA EMFs		
SO ₂ Control	Particulate Control	NO _x Control	Bit Coal	Sub Coal	Lignite Coal	Bit Coal	Sub Coal	Lignite Coal
None	BH	---	0.11	0.27	0.27	0.11	0.26	1.00
Wet	BH	None	0.05	0.27	0.27	0.03	0.27	1.00
Wet	BH	SCR	0.10	0.27	0.27	0.10	0.15	0.56
Dry	BH	---	0.05	0.75	0.75	0.05	0.75	1.00
None	CSE	---	0.64	0.97	0.97	0.64	0.97	1.00
Wet	CSE	None	0.34	0.73	0.73	0.34	0.84	0.56
Wet	CSE	SCR	0.10	0.73	0.73	0.10	0.34	0.56
Dry	CSE	---	0.64	0.65	0.65	0.64	0.65	1.00
None	HSE/Oth	---	0.90	0.94	0.94	0.90	0.94	1.00
Wet	HSE/Oth	None	0.58	0.80	0.80	0.58	0.80	1.00
Wet	HSE/Oth	SCR	0.42	0.76	0.76	0.10	0.75	1.00
Dry	HSE/Oth	---	0.60	0.85	0.85	0.60	0.85	1.00

Notes: SO₂ Controls - Wet = Wet Scrubber and Dry = Dry Scrubber, Particulate Controls, BH - fabric filter/baghouse. CSE = cold side electrostatic precipitator, HSE = hot side electrostatic precipitator, NO_x Controls, SCR = selective catalytic reduction, --- = not applicable, Bit = bituminous coal, Sub = subbituminous coal. The NO_x control system is not assumed to enhance mercury removal unless a wet scrubber is present, so it is left blank in such configurations.

Sources: EPA, EMFs. <http://www.epa.gov/clearskies/technical.html> EIA EMFs not from EPA: Lignite EMFs, Mercury Control Technologies for Coal-Fired Power Plants, presented by the Office of Fossil Energy on July 8, 2003. Bituminous coal mercury removal for a Wet/HSE/Oth/SCR configured plant, Table EMF1, Analysis of Mercury Control Cost and Performance, Office of Fossil Energy & National Energy Technology Laboratory, U.S. Department of Energy, January 2003, Washington, DC.

Table 47. Planned SO₂ Scrubber Additions Represented by Region

Region	Capacity (Gigawatts)
East Central Area Reliability Coordination Agreement	4.2
Electric Reliability Council of Texas	0.0
Mid-Atlantic Area Council	1.2
Mid-America Interconnected Network	0.0
Mid-Continent Area Power Pool	0.5
New York	0.0
New England	0.6
Florida Reliability Coordinating Council	0.0
Southeastern Electric Reliability Council	13.5
Southwest Power Pool	0.0
Northwest Power Pool	0.0
Rocky Mountain Power Area, Arizona, New Mexico, and Southern Nevada	0.0
California	0.0
Total	20.1

Source: Energy Information Administration, Office of Integrated Analysis and Forecasting, based on public announcements and reports to Form EIA-767, "Annual Steam-Electric Plant Operation and Design Data".

Table 48. Cost and Performance Characteristics for Fossil-Fueled Generating Technologies: Three Cases

	Total Overnight Cost in 2006 Reference (2005 \$/kW)	Total Overnight Cost ¹			Heatrate In 2006 (Reference) Btu/kWhr	Heat Rate		
		Reference (2005 \$/kW)	High Fossil (2005 \$/kW)	Low Fossil (2005 \$/kW)		Reference Btu/kWhr	High Fossil Btu/kWhr	Low Fossil Btu/kWhr
Pulverized Coal	1290				6844			
2015		1260	1260	1260		8661	8661	8661
2020		1235	1243	1232		8600	8600	8600
2025		1219	1226	1213		8600	8600	8600
2030		1209	1209	1205		8600	8600	8600
Advanced Coal	1491				8309			
2015		1436	1355	1491		7477	6937	8309
2020		1400	1280	1491		7200	6480	8309
2025		1335	1205	1491		7200	6480	8309
2030		1254	1129	1491		7200	6480	8309
Conventional Combined Cycle	603				7163			
2015		569	589	589		6866	6866	6866
2020		581	581	581		6800	6800	6800
2025		573	573	573		6800	6800	6800
2030		565	565	565		6800	6800	6800
Advanced Gas Technology	594				6717			
2015		576	564	594		6403	5875	6717
2020		561	522	594		6333	5700	6717
2025		542	497	594		6333	5700	6717
2030		525	472	594		6333	5700	6717
Conventional Combustion Turbine	420				10807			
2015		410	410	410		10486	10486	10486
2020		405	405	405		10450	10450	10450
2025		399	399	399		10450	10450	10450
2030		394	394	394		10450	10450	10450
Advanced Combustion Turbine	398				9166			
2015		384	362	398		8612	7828	9166
2020		371	343	398		8550	7695	9166
2025		353	323	398		8550	7695	9166
2030		337	304	398		8550	7695	9166

¹Total overnight cost (including project contingency, technological optimism and learning factors, but excluding regional multipliers), for projects initiated in the given year.

Source: AEO2007 National Energy Modeling System runs: AEO2007.D112106A, HFOSS07.D112706A, LFOSS07.D112706A.

Table 49. Cost Characteristics for Advanced Nuclear Technology: Two Cases

Advanced Nuclear Technology	Overnight Cost in 2006 (Reference) (2005\$/kW)	Total Overnight Cost ¹		
		Reference Case (2005\$/kW)	Low Nuclear Cost (2005\$/kW)	High Nuclear Cost (2005\$/kW)
	2081			
2015		1983	1886	2080
2020		1797	1777	2080
2025		1795	1667	2080
2030		1732	1559	2080

¹Total overnight cost (including project contingency, technological optimism and learning factors, but excluding regional multipliers), for projects initiated in the given year.

Source: AEO2007 National Energy Modeling System runs: AEO2007.D112106A, ADVNUC07.D112906A, LONUC07.D112706A.