

## Appendix A: Global CME Temperature Contracts

U.S.										
<b>24 Cities</b>	Atlanta	Baltimore	Boston	Chicago	Cincinnati	Colorado Spring	Dallas	Des Moines		
	Detroit	Houston	Jacksonville	Kansas City	Las Vegas	Little Rock	Los Angeles	Minneapolis-St. Paul		
	New York	Philadelphia	Portland	Raleigh	Sacramento	Salt Lake City	Tucson	Washington D.C.		
<b>Indexes</b>	CDD Monthly			HDD Monthly			Weekly Average Temperature			
	CDD Seasonal Strip			HDD Seasonal Strip						
<b>Instruments</b>	futures: traded on CME Globex			options: traded via Open Outcry						
<b>Pricing Unit</b>	Dollars per index point									
<b>Tick Size</b>	Full tick = 1 index point = \$20 per contract and 0.1 index point = \$10 for Weekly Average Temperature contracts									

Europe						
<b>10 Cities</b>	Amsterdam	Barcelona	Berlin	Essen	London	Madrid
	Oslo	Paris	Prague	Rome	Stockholm	
<b>Indexes</b>	CAT Monthly			HDD Monthly		
	CAT Seasonal Strip			HDD Seasonal Strip		
<b>Instruments</b>	futures: traded on CME Globex			options: traded via Open Outcry		
<b>Pricing Unit</b>	Euros per index point for all locations but London					
	British Pounds per index point for London					
<b>Tick Size</b>	Full tick = 1 index point = €20 per contract for all locations but London					
	Full tick = 1 index point = £20 per contract for London					

Canada						
<b>6 Cities</b>	Calgary	Edmonton	Montreal	Toronto	Vancouver	Winnipeg
<b>Indexes</b>	CDD Monthly		HDD Monthly		CAT Monthly	
	CDD Seasonal Strip		HDD Seasonal Strip		CAT Seasonal Strip	
<b>Instruments</b>	futures: traded on CME Globex		options: traded via Open Outcry			
<b>Pricing Unit</b>	Canadian Dollars per index point					
<b>Tick Size</b>	Full tick = 1 index point = CAN\$20 per contract					

Australia			
<b>3 Cities</b>	Sydney	Brisbane	Melbourne
<b>Indexes</b>	CDD Monthly		HDD Monthly
	CDD Seasonal Strip		HDD Seasonal Strip
<b>Instruments</b>	futures: traded on CME Globex		options: traded via Open Outcry
<b>Pricing Unit</b>	Australian Dollars per index point		
<b>Tick Size</b>	Full tick = 1 index point = AUS\$20 per contract		

Asia-Pacific			
<b>3 Cities</b>	Hiroshima	Tokyo	Osaka
<b>Indexes</b>	CAT Monthly		
	CAT Seasonal Strip		
<b>Instruments</b>	futures: traded on CME Globex		options: traded via Open Outcry
<b>Pricing Unit</b>	Japanese Yen per index point		
<b>Tick Size</b>	Full tick = 0.01 index point = ¥25 per contract		

Table A.1: Overview of global temperature contracts traded on the CME.

# Appendix B: Temperature Model Estimation Results<sup>1</sup>

## 1. The CD Models

### 1.1 The Conditional Mean Model

1961-2010

DAT	$R^2$	$a_0$	$a_1$	$b_{c,1}$	$b_{s,1}$	$b_{c,2}$	$b_{s,2}$	$b_{c,3}$	$b_{s,3}$	$\alpha_1$	$\alpha_2$	$\alpha_3$	$\alpha_4$	$\alpha_5$	$\alpha_6$
CD Original Main Model	91.48%	53.5160	0.0002	-20.4325	-8.8860	-0.3139**	0.0631***	-0.1111***	-0.6892	0.8193	-0.2746	0.1046	-0.0189**	0.0156***	0.0060***
St. Error		(0.2481)	(0.0000)	(0.1847)	(0.1802)	(0.1761)	(0.1755)	(0.1606)	(0.1635)	(0.0078)	(0.0101)	(0.0101)	(0.0099)	(0.0099)	(0.0099)
		$\alpha_7$	$\alpha_8$	$\alpha_9$	$\alpha_{10}$	$\alpha_{11}$	$\alpha_{12}$	$\alpha_{13}$	$\alpha_{14}$	$\alpha_{15}$	$\alpha_{16}$	$\alpha_{17}$	$\alpha_{18}$	$\alpha_{19}$	$\alpha_{20}$
St. Error		0.0064***	0.0025***	0.0105***	0.0022***	-0.0010***	0.0050***	-0.0040***	0.0037***	0.0052***	0.0118***	-0.0140***	0.0190	-0.0130***	0.0084***
		(0.0099)	(0.0099)	(0.0098)	(0.0098)	(0.0098)	(0.0098)	(0.0098)	(0.0097)	(0.0097)	(0.0095)	(0.0095)	(0.0097)	(0.0098)	(0.0096)
		$\alpha_{21}$	$\alpha_{22}$	$\alpha_{23}$	$\alpha_{24}$	$\alpha_{25}$									
St. Error		0.0149***	-0.0052***	0.0054***	0.0041***	0.0000***									
		(0.0095)	(0.0095)	(0.0094)	(0.0093)	(0.0072)									

Table B.1: Daily average temperature parameter estimates of the conditional mean equation for the period 1961-2010.

DAT	$R^2$	$a_0$	$a_1$	$b_{c,4}$	$b_{s,4}$	$b_{c,8}$	$b_{s,8}$	$b_{c,12}$	$b_{s,12}$	$\alpha_1$	$\alpha_2$	$\alpha_3$	$\alpha_4$	$\alpha_5$
Submodel 1	91.47%	53.5037	0.0002	-20.4986	-8.7947	-0.3086*	0.0653***	-0.1291***	-0.6816	0.8217	-0.2751	0.1078	-0.0220*	0.0266
St. Error		(0.2082)	(0.0000)	(0.1567)	(0.1529)	(0.1548)	(0.1538)	(0.1478)	(0.1503)	(0.0078)	(0.0101)	(0.0100)	(0.0097)	(0.0074)
Submodel 2	91.47%	54.0459	0.0000	-20.5028	-8.7946	-0.3093*	0.0635***	-0.1281***	-0.6816	0.8216	-0.2751	0.1077	-0.0220*	0.0265
St. Error		(0.1581)	(0.0000)	(0.1566)	(0.1527)	(0.1546)	(0.1537)	(0.1477)	(0.1507)	(0.0078)	(0.0101)	(0.0100)	(0.0097)	(0.0074)

Table B.2: Daily average temperature parameter estimates of the conditional mean equation for the period 1961-2010.

<sup>1</sup> \*\*\* denotes not statistically significant;

\*\* indicates statistically significant at the 10% level;

\* indicates statistically significant at the 5% level.

Parameters without asterisk are statistically significant at the 1% level or lower.

All standard errors are robust or semi-robust.

Max	$R^2$	$a_0$	$a_1$	$b_{c,4}$	$b_{s,4}$	$b_{c,8}$	$b_{s,8}$	$b_{c,12}$	$b_{s,12}$	$\alpha_1$	$\alpha_2$	$\alpha_3$
Submodel 3a	86.82%	60.2175	0.0002	-21.6670	-8.3796	-0.5805	-0.1819***	-0.1171***	-0.5858	0.6361	-0.1166	0.0537
St. Error		(0.2222)	(0.0000)	(0.1640)	(0.1636)	(0.1642)	(0.1620)	(0.1577)	(0.1601)	(0.0078)	(0.0090)	(0.0075)
Submodel 4a	86.82%	60.7988	0.0000	-21.6704	-8.3798	-0.5820	-0.1839***	-0.1160***	-0.5850	0.6362	-0.1166	0.0538
St. Error		(0.1690)	(0.0000)	(0.1641)	(0.1637)	(0.1643)	(0.1621)	(0.1578)	(0.1602)	(0.0078)	(0.0090)	(0.0075)

Table B.3: Daily maximum temperature parameter estimates of the conditional mean equation for the period 1961-2010.

Min	$R^2$	$a_0$	$a_1$	$b_{c,4}$	$b_{s,4}$	$b_{c,8}$	$b_{s,8}$	$b_{c,12}$	$b_{s,12}$	$\alpha_1$	$\alpha_2$	$\alpha_3$
Submodel 3b	90.67%	46.7886	0.0002	-19.4517	-9.1862	-0.0733***	0.2987*	-0.1429	-0.7666***	0.8151	-0.2457	0.0793
St. Error		(0.1896)	(0.0000)	(0.1477)	(0.1383)	(0.1421)	(0.1432)	(0.1350)	(0.1364)	(0.0082)	(0.0097)	(0.0076)
Submodel 4b	90.67%	47.3106	0.0000	-19.4537	-9.1873	-0.0728***	0.2977*	-0.1420	-0.7663***	0.8149	-0.2458	0.0790
St. Error		(0.1451)	(0.0000)	(0.1475)	(0.1380)	(0.1419)	(0.1430)	(0.1348)	(0.1362)	(0.0082)	(0.0097)	(0.0076)

Table B.4: Daily minimum temperature parameter estimates of the conditional mean equation for the period 1961-2010.

## 2001-2010

DAT	$R^2$	$a_0$	$b_{c,4}$	$b_{s,4}$	$\alpha_1$	$\alpha_2$	$\alpha_3$
Submodel 5	91.87%	56.3702	-20.4825	-9.2626	0.8388	-0.2670	0.1124
St. Error		(0.2617)	(0.3560)	(0.3570)	(0.0168)	(0.0217)	(0.0167)

Table B.5: Daily average temperature parameter estimates of the conditional mean equation for the period 2001-2010.

Max	$R^2$	$a_0$	$b_{c,4}$	$b_{s,4}$	$\alpha_1$	$\alpha_2$	$\alpha_3$
Submodel 6a	86.98%	63.0091	-21.5719	-8.6907	0.6633	-0.1227	0.0734
St. Error		(0.2898)	(0.3843)	(0.3952)	(0.0170)	(0.0202)	(0.0166)

Table B.6: Daily maximum temperature parameter estimates of the conditional mean equation for the period 2001-2010.

Min	$R^2$	$a_0$	$b_{c,4}$	$b_{s,4}$	$c_{c,8}$	$c_{s,8}$	$\alpha_1$	$\alpha_2$	$\alpha_3$
Submodel 6b	92.79%	49.7408	-19.3718	-9.7636	0.0877***	0.7013*	0.8227	-0.2196	0.0805
St. Error		(0.2365)	(0.3460)	(0.3270)	(0.3168)	(0.3302)	(0.0181)	(0.0219)	(0.0166)

Table B.7: Daily minimum temperature parameter estimates of the conditional mean equation for the period 2001-2010.

## 1.2 The Conditional Variance Model

1961-2010

DAT	$R^2$	$a_0$	$c_{c,1}$	$c_{s,1}$	$c_{c,2}$	$c_{s,2}$	$c_{c,3}$	$c_{s,3}$	$\beta_{a1}$	$\beta_{g1}$
CD Original Main Model	5.10%	1.4860	0.4245	0.2221	-0.0218***	-0.0793	0.0412*	0.0892	0.0467	0.7705
St. Error		(0.2708)	(0.0194)	(0.0214)	(0.0194)	(0.0187)	(0.0204)	(0.0191)	(0.0081)	(0.0551)

Table B.8: Daily average temperature parameter estimates of the conditional variance equation for the period 1961-2010.

DAT	$R^2$	$a_0$	$c_{c,4}$	$c_{s,4}$	$c_{c,8}$	$c_{s,8}$	$c_{c,12}$	$c_{s,12}$	$\beta_{a1}$	$\beta_{g1}$
Submodel 1	5.08%	1.4957	0.4223	0.2176	-0.0205***	-0.0808	0.0445*	0.0892	0.0471	0.7686
St. Error		(0.2786)	(0.0194)	(0.0214)	(0.0195)	(0.0187)	(0.0204)	(0.0192)	(0.0082)	(0.0572)
Submodel 2	5.09%	1.4853	0.04229	0.2178	-0.0202***	-0.0808	0.0447*	0.0887	0.0468	0.7709
St. Error		(0.2771)	(0.0195)	(0.0214)	(0.0195)	(0.0187)	(0.0205)	(0.0192)	(0.0081)	(0.0563)

Table B.9: Daily average temperature parameter estimates of the conditional variance equation for the period 1961-2010.

Max	$R^2$	$a_0$	$c_{c,4}$	$c_{s,4}$	$c_{c,8}$	$c_{s,8}$	$c_{c,12}$	$c_{s,12}$	$\beta_{a1}$	$\beta_{g1}$
Submodel 3a	4.11%	2.2271	0.2916	0.3118	-0.0456*	-0.1503	0.0536	0.0667	0.0557	0.7251
St. Error		(0.2660)	(0.0197)	(0.0202)	(0.0202)	(0.0186)	(0.0199)	(0.0192)	(0.0093)	(0.0651)
Submodel 4a	4.12%	2.2280	0.2921	0.3123	-0.0450*	-0.1503	0.0534	0.0663	0.0555	0.7251
St. Error		(0.2684)	(0.0197)	(0.0202)	(0.0202)	(0.0186)	(0.0199)	(0.0192)	(0.0093)	(0.0657)

Table B.10: Daily maximum temperature parameter estimates of the conditional variance equation for the period 1961-2010.

Min	$R^2$	$a_0$	$c_{c,4}$	$c_{s,4}$	$c_{c,8}$	$c_{s,8}$	$c_{c,12}$	$c_{s,12}$	$b_{c,16}$	$b_{s,16}$	$\beta_{a1}$	$\beta_{g1}$
Submodel 3b	5.41%	2.4197	0.5779	0.1155	0.0407*	-0.0058***	0.0109***	0.1328	0.0006***	-0.0417*	0.0748	0.3762*
St. Error		(0.2883)	(0.0194)	(0.0195)	(0.0187)	(0.0197)	(0.0195)	(0.0193)	(0.0195)	(0.0190)	(0.0123)	(0.1655)
Submodel 4b		2.4125	0.5780	0.1164	0.0411*	-0.0060***	0.0111***	0.1326	-0.0001***	-0.0412*	0.0743	0.3805*
St. Error		(0.2929)	(0.0194)	(0.0195)	(0.0187)	(0.0197)	(0.0195)	(0.0193)	(0.0195)	(0.0190)	(0.0124)	(0.1671)

Table B.11: Daily minimum temperature parameter estimates of the conditional variance equation for the period 1961-2010.

2001-2010

DAT	$R^2$	$a_0$	$c_{c,4}$	$c_{s,4}$	$c_{c,8}$	$c_{s,8}$	$\beta_{a1}$	$\beta_{g1}$
Submodel 5	5.12%	1.2001	0.4152	0.2736	-0.0501***	-0.1480	0.0351	0.8220
St. Error		(0.3452)	(0.0428)	(0.0440)	(0.0422)	(0.0412)	(0.0135)	(0.0557)

Table B.12: Daily average temperature parameter estimates of the conditional variance equation for the period 2001-2010.

Max	$R^2$	$a_0$	$c_{c,4}$	$c_{s,4}$	$c_{c,8}$	$c_{s,8}$	$\beta_{a1}$	$\beta_{g1}$
Submodel 6a	4.95%	1.8871	0.3010	0.3785	-0.0807**	-0.2015	0.0471	0.7922
St. Error		(0.3373)	(0.0453)	(0.0447)	(0.0456)	(0.0432)	(0.0145)	(0.0612)

Table B.13: Daily maximum temperature parameter estimates of the conditional variance equation for the period 2001-2010.

Min	$R^2$	$a_0$	$c_{c,4}$	$c_{s,4}$	$\beta_{a1}$
Submodel 6b	5.22%	2.8150	0.5316	0.1635	0.1108
St. Error		(0.0372)	(0.0432)	(0.0421)	(0.0261)

Table B.14: Daily minimum temperature parameter estimates of the conditional variance equation for the period 2001-2010.

## 2. The Adapted BSB Model

### 2.1 The Seasonal Mean Model

1961-2010

DAT	$R^2$	$a_0$	$a_1$	$b_{c,1}$	$b_{s,1}$
BSB Original Main Model	83.38%	53.4941	0.0002	-20.5303	-8.8597
St. Error		(0.1035)	(0.0000)	(0.0762)	(0.0719)

Table B.15: Daily average temperature parameter estimates of the seasonal mean equation for the period 1961-2010.

DAT	$R^2$	$a_0$	$a_1$	$b_{c,4}$	$b_{s,4}$	$b_{c,8}$	$b_{s,8}$	$b_{c,12}$	$b_{s,12}$
Submodel 7	83.49%	53.4878	0.0002	-20.5751	-8.7643	-0.3546	0.0406***	-0.1779*	-0.7055
St. Error		(0.1031)	(0.0000)	(0.0759)	(0.0717)	(0.0743)	(0.0733)	(0.0734)	(0.0743)
Submodel 8	83.49%	54.0698	0.0000	-20.5752	-8.7650	-0.3546	0.0403***	-0.1779*	-0.7058
St. Error		(0.0776)	(0.0000)	(0.0760)	(0.0716)	(0.0743)	(0.0733)	(0.0733)	(0.0743)

Table B.16: Daily average temperature parameter estimates of the seasonal mean equation for the period 1961-2010.

Max	$R^2$	$a_0$	$a_1$	$b_{c,4}$	$b_{s,4}$	$b_{c,8}$	$b_{s,8}$	$b_{c,12}$	$b_{s,12}$
Submodel 9a	79.84%	60.2871	0.0002	-21.5963	-8.3246	-0.5951	-0.1574**	-0.1773*	-0.5802
St. Error		(0.1206)	(0.0000)	(0.0871)	(0.0856)	(0.0868)	(0.0859)	(0.0859)	(0.0868)
Submodel 10a	79.83%	60.9090	0.0000	-21.5963	-8.3257	-0.5951	-0.1580**	-0.1773*	-0.5806
St. Error		(0.0905)	(0.0000)	(0.0872)	(0.0856)	(0.0868)	(0.0859)	(0.0859)	(0.0868)

Table B.17: Daily maximum temperature parameter estimates of the seasonal mean equation for the period 1961-2010.

Min	$R^2$	$a_0$	$a_1$	$b_{c,4}$	$b_{s,4}$	$b_{c,8}$	$b_{s,8}$	$b_{c,12}$	$b_{s,12}$	$b_{c,16}$	$b_{s,16}$	$b_{c,20}$	$b_{s,20}$
Submodel 9b	84.10%	46.6890	0.0002	-19.5539	-9.2041	-0.1141**	0.2385	-0.1785	-0.8308	-0.0824***	-0.1845	-0.1584*	0.0963***
St. Error		(0.0981)	(0.0000)	(0.0728)	(0.0666)	(0.0703)	(0.0692)	(0.0694)	(0.0702)	(0.0692)	(0.0703)	(0.0689)	(0.0706)
Submodel 10b	84.12%	47.2309	0.0000	-19.5540	-9.2043	-0.1141**	0.2385	-0.1785	-0.8309	-0.0824***	-0.1845	-0.1583*	0.0963***
St. Error		(0.0740)	(0.0000)	(0.0728)	(0.0666)	(0.0703)	(0.0692)	(0.0693)	(0.0702)	(0.0691)	(0.0703)	(0.0689)	(0.0706)

Table B.18: Daily minimum temperature parameter estimates of the seasonal mean equation for the period 1961-2010.

## 2001-2010

DAT	$R^2$	$a_0$	$a_1$	$b_{c,4}$	$b_{s,4}$
Submodel 11	83.29%	56.1803	0.0000*	-20.4488	-9.1284
St. Error		(0.1783)	(0.0000)	(0.1709)	(0.1615)

Table B.19: Daily average temperature parameter estimates of the seasonal mean equation for the period 2001-2010.

Max	$R^2$	$a_0$	$b_{c,4}$	$b_{s,4}$
Submodel 12ab	79.10%	63.2115	-21.4523	-8.4807
St. Error		(0.1388)	(0.1966)	(0.1960)

Table B.20: Daily maximum temperature parameter estimates of the seasonal mean equation for the period 2001-2010.

Min	$R^2$	$a_0$	$a_1$	$b_{c,4}$	$b_{s,4}$	$b_{c,8}$	$b_{s,8}$	$b_{c,12}$	$b_{s,12}$
Submodel 12a	85.01%	49.3041	0.0002*	-19.4436	-9.8035	0.0397***	0.3604*	0.2299**	-0.9370
St. Error		(0.2153)	(0.0001)	(0.1603)	(0.1429)	(0.1529)	(0.1508)	(0.1498)	(0.1538)
Submodel 12b	85.01%	49.4102	0.0000	-19.4444	-9.8009	0.0395***	0.3617*	0.2298**	-0.9361
St. Error		(0.1628)	(0.0000)	(0.1604)	(0.1429)	(0.1529)	(0.1506)	(0.1498)	(0.1536)

Table B.21: Daily minimum temperature parameter estimates of the seasonal mean equation for the period 2001-2010.

## 2.2 The Autoregressive Model

### 1961-2010

DAT	$R^2$	$\alpha_1$	$\alpha_2$	$\alpha_3$	$\alpha_4$	$\alpha_5$
BSB Original Main Model	48.58%	0.8272	-0.2852	0.1243	-0.0299	0.0359
St. Error		(0.0082)	(0.0107)	(0.0107)	(0.0103)	(0.0079)

Table B.22: Daily average temperature parameter estimates of the AR(p) model for the period 1961-2010.

DAT	$R^2$	$\alpha_1$	$\alpha_2$	$\alpha_3$	$\alpha_4$	$\alpha_5$
Submodel 7	48.37%	0.8267	-0.2867	0.1246	-0.0307	0.0341
St. Error		(0.0082)	(0.0107)	(0.0107)	(0.0103)	(0.0079)
Submodel 8	48.37%	0.8267	-0.2865	0.1246	-0.0307	0.0341
St. Error		(0.0082)	(0.0107)	(0.0107)	(0.0103)	(0.0079)

Table B.23: Daily average temperature parameter estimates of the AR(p) model for the period 1961-2010.

Max	$R^2$	$\alpha_1$	$\alpha_2$	$\alpha_3$	$\alpha_4$
Submodel 9a	34.64%	0.6310	-0.1104	0.0473	0.0167*
St. Error		(0.0081)	(0.0096)	(0.0096)	(0.0079)
Submodel 10a	34.67%	0.6312	-0.1103	0.0473	0.0169*
St. Error		(0.0081)	(0.0097)	(0.0096)	(0.0079)

Table B.24: Daily maximum temperature parameter estimates of the AR(p) model for the period 1961-2010.

Min	$R^2$	$\alpha_1$	$\alpha_2$	$\alpha_3$	$\alpha_4$
Submodel 9b	49.76%	0.8350	-0.2626	0.0784	0.0213
St. Error		(0.0085)	(0.0104)	(0.0106)	(0.0082)
Submodel 10b	49.76%	0.8348	-0.2627	0.0783	0.0211
St. Error		(0.0084)	(0.0104)	(0.0106)	(0.0082)

Table B.25: Daily minimum temperature parameter estimates of the AR(p) model for the period 1961-2010.

## 2001-2010

DAT	$R^2$	$\alpha_1$	$\alpha_2$	$\alpha_3$
Submodel 11	50.79%	0.8370	-0.2696	0.1205
St. Error		(0.0179)	(0.0231)	(0.0182)

Table B.26: Daily average temperature parameter estimates of the AR(p) model for the period 2001--2010.

Max	$R^2$	$\alpha_1$	$\alpha_2$	$\alpha_3$
Submodel 12ab	37.7%	0.6527	-0.1110	0.0733
St. Error		(0.0178)	(0.0212)	(0.0179)

Table B.27: Daily maximum temperature parameter estimates of the AR(p) model for the period 2001-2010.

Min	$R^2$	$\alpha_1$	$\alpha_2$	$\alpha_3$
Submodel 12a	52.06%	0.8460	-0.2513	0.0971
St. Error		(0.0193)	(0.0228)	(0.0181)
Submodel 12b	52.05%	0.8459	-0.2513	0.0970
St. Error		(0.0193)	(0.0228)	(0.0181)

Table B.28: Daily minimum temperature parameter estimates of the AR(p) model for the period 2001-2010.

## 2.3 The Seasonal Variance

1961-2010

DAT	$R^2$	$c_0$	$c_{c,1}$	$c_{s,1}$
BSB Original Main Model	4.31%	25.7386	9.7806	6.3371
St. Error		(0.2882)	(0.4106)	(0.4046)

Table B.29: Daily average temperature parameter estimates of the seasonal variance equation for the period 1961-2010.

DAT	$R^2$	$c_0$	$c_{c,4}$	$c_{s,4}$
Submodel 7	4.27%	25.6766	9.7712	6.2214
St. Error		(0.2869)	(0.4090)	(0.4024)
Submodel 8	4.28%	25.6763	9.7781	6.2345
St. Error		(0.2869)	(0.4091)	(0.4024)

Table B.30: Daily average temperature parameter estimates of the seasonal variance equation for the period 1961-2010.

Max	$R^2$	$c_0$	$c_{c,4}$	$c_{s,4}$	$c_{c,8}$	$c_{s,8}$	$c_{c,12}$	$c_{s,12}$
Submodel 9a	3.42%	44.4548	10.5334	14.0999	-0.8836***	-4.3951	2.5019	1.9968
St. Error		(0.5131)	(0.7081)	(0.7426)	(0.7470)	(0.7035)	(0.7239)	(0.7272)
Submodel 10a	3.43%	44.4617	10.5529	14.1198	-0.8717***	-4.3933	2.4980	1.9803
St. Error		(0.5131)	(0.7083)	(0.7426)	(0.7468)	(0.7039)	(0.7240)	(0.7273)

Table B.31: Daily maximum temperature parameter estimates of the seasonal variance equation for the period 1961-2010.

Min	$R^2$	$c_0$	$c_{c,4}$	$c_{s,4}$	$c_{c,8}$	$c_{s,8}$	$c_{c,12}$	$c_{s,12}$
Submodel 9b	5.13%	22.3176	12.1737	2.9824	2.3642	1.1940	0.4152***	2.6260
St. Error		(0.2943)	(0.4486)	(0.3812)	(0.4102)	(0.4222)	(0.4138)	(0.4187)
Submodel 10b	5.14%	22.3127	12.1759	2.9970	2.3700	1.1968	0.4138***	2.6240
St. Error		(0.2943)	(0.4485)	(0.3811)	(0.4099)	(0.4223)	(0.4138)	(0.4185)

Table B.32: Daily minimum temperature parameter estimates of the seasonal variance equation for the period 1961-2010.

2001-2010

DAT	$R^2$	$c_0$	$c_{c,4}$	$c_{s,4}$
Submodel 11	4.39%	24.7623	8.5812	7.3007
St. Error		(0.6158)	(0.8548)	(0.8866)

Table B.33: Daily average temperature parameter estimates of the seasonal variance equation for the period 2001-2010.



Max	$R^2$	$c_0$	$c_{c,4}$	$c_{s,4}$	$c_{c,8}$	$c_{s,8}$	$c_{c,12}$	$c_{s,12}$
Submodel 12ab	4.50%	43.7745	9.1136	17.0411	-2.1244***	-6.8024	3.5946*	-0.9423***
St. Error		(1.1288)	(1.1288)	(1.6595)	(1.6253)	(1.5670)	(1.6089)	(1.5838)

Table B.34: Daily maximum temperature parameter estimates of the seasonal variance equation for the period 2001-2010.

Min	$R^2$	$c_0$	$c_{c,4}$	$c_{s,4}$	$c_{c,8}$	$c_{s,8}$
Submodel 12a	4.56%	20.1061	9.9482	3.4710	1.6261*	0.5153***
St. Error		(0.5714)	(0.8295)	(0.7862)	(0.7977)	(0.8183)
Submodel 12b	4.57%	20.1047	9.9505	3.4620	1.6317*	0.5137***
St. Error		(0.5712)	(0.8294)	(0.7856)	(0.7975)	(0.8179)

Table B.35: Daily minimum temperature parameter estimates of the seasonal variance equation for the period 2001-2010.

## 2.4 The ARCH-GARCH Model

1961-2010

DAT	$\beta_{a1}$	$\beta_{g1}$
BSB Original Main Model	0.0463	0.7910
St. Error	(0.0073)	(0.0443)

Table B.36: Daily average temperature GARCH parameter estimates for the period 1961-2010.

DAT	$\beta_{a1}$	$\beta_{g1}$
Submodel 7	0.0468	0.7880
St. Error	(0.0074)	(0.0456)
Submodel 8	0.0465	0.7893
St. Error	(0.0073)	(0.0452)

Table B.37: Daily average temperature GARCH parameter estimates for the period 1961-2010.

Max	$\beta_{a1}$	$\beta_{g1}$
Submodel 9a	0.0550	0.7224
St. Error	(0.0090)	(0.0646)
Submodel 10a	0.0548	0.7218
St. Error	(0.0091)	(0.0665)

Table B.38: Daily maximum temperature GARCH parameter estimates for the period 1961-2010.

<i>Min</i>	$\beta_{a1}$	$\beta_{g1}$
Submodel 9b	0.0710	0.4100*
St. Error	(0.0129)	(0.1835)
Submodel 10b	0.0705	0.4139*
St. Error	(0.0130)	(0.1862)

Table B.39: Daily minimum temperature GARCH parameter estimates for the period 1961-2010.

## 2001-2010

<i>DAT</i>	$\beta_{a1}$	$\beta_{g1}$
Submodel 11	0.0386	0.8218
St. Error	(0.0129)	(0.0535)

Table B.40: Daily average temperature GARCH parameter estimate for the period 2001-2010.

<i>Max</i>	$\beta_{a1}$	$\beta_{g1}$
Submodel 12a	0.0449	0.7844
St. Error	(0.0147)	(0.0852)

Table B.41: Daily maximum temperature GARCH parameter estimate for the period 2001-2010.

<i>Min</i>	$\beta_{a1}$
Submodel 12b	0.1083
St. Error	(0.0260)
Submodel 12c	0.1084
St. Error	(0.0178)

Table B.42: Daily minimum temperature ARCH parameter estimate for the period 2001-2010

## Appendix C<sup>2</sup>: Monthly Index Forecasts & Forecast Errors

HDDJan11 - H4F11		1026.0						
Actual Index		1-month ahead forecasts:						
		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast
CD Submodels	CD Submodel 1	957.5	857.5	1046.7	(892.8; 1023.4)	68.5	6.68	under
	CD Submodel 2	943.2	843.2	1032.4	(878.5; 1009.1)	82.8	8.07	under
	CD Submodel 3	959.3	846.1	1059.8	(885.9; 1033.6)	66.7	6.50	under
	CD Submodel 4	945.1	831.9	1045.6	(871.7; 1019.4)	80.9	7.88	under
	CD Submodel 5	945.5	852.4	1028.1	(885.1; 1006.5)	80.5	7.84	under
	CD Submodel 6	938.9	834.1	1031.3	(870.7; 1007.4)	87.1	8.49	under
BSB Submodels	BSB Submodel 7	950.4	851.0	1039.5	(886.0; 1016.2)	75.6	7.36	under
	BSB Submodel 8	936.5	837.4	1025.3	(872.4; 1002.1)	89.5	8.72	under
	BSB Submodel 9	953.0	837.9	1055.5	(878.5; 1028.7)	73.0	7.11	under
	BSB Submodel 10	939.0	823.9	1041.4	(864.5; 1014.7)	87.0	8.48	under
	BSB Submodel 11	915.8	819.3	1002.6	(853.2; 979.8)	110.2	10.74	under
	BSB Submodel 12a	932.0	824.2	1027.1	(861.9; 1002.3)	94.0	9.16	under
	BSB Submodel 12b	929.2	821.4	1024.3	(859.1; 999.5)	96.8	9.44	under
	Market Model	1015.0	-	-	-	11.0	1.07	under
Benchmark Models	CD Original Main Model	960.7	860.7	1049.9	(896.0; 1026.6)	65.3	6.36	under
	BSB Original Main Model	925.1	825.6	1014.3	(860.6; 991.0)	100.9	9.83	under
	10-Year Average Index	965.0	727.5	1220.5	(727.5; 1220.5)	61.1	5.95	under
	30-Year Average Index	983.5	727.5	1250.5	(727.5; 1250.5)	42.5	4.14	under
	50-Year Average Index	1010.3	727.5	1323.5	(741.5; 1250.5)	15.7	1.53	under
	Market Model	1015.0	-	-	-	11.0	1.07	under

HDDFeb11 - H4G11		779.0						
Actual Index		2-month ahead forecasts:						
		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast
CD Submodels	CD Submodel 1	820.2	714.8	920.4	(760.7; 885.9)	41.2	5.29	over
	CD Submodel 2	806.9	701.4	907.1	(747.4; 872.6)	27.9	3.58	over
	CD Submodel 3	820.8	702.0	933.4	(753.7; 894.7)	41.8	5.36	over
	CD Submodel 4	807.6	688.9	920.3	(740.6; 881.5)	28.6	3.67	over
	CD Submodel 5	827.5	726.2	922.4	(771.3; 890.4)	48.5	6.23	over
	CD Submodel 6	817.0	702.6	924.2	(753.5; 888.0)	38.0	4.88	over
BSB Submodels	BSB Submodel 7	817.5	707.4	920.7	(756.1; 885.7)	38.5	4.97	over
	BSB Submodel 8	803.9	693.8	907.2	(742.6; 872.2)	24.9	3.20	over
	BSB Submodel 9	816.0	694.6	931.2	(747.5; 891.6)	37.0	4.75	over
	BSB Submodel 10	802.5	681.0	917.6	(733.9; 878.0)	23.5	3.01	over
	BSB Submodel 11	805.7	697.1	907.3	(745.4; 873.0)	26.7	3.42	over
	BSB Submodel 12a	822.2	706.9	930.6	(758.0; 893.9)	43.2	5.55	over
	BSB Submodel 12b	819.4	704.0	927.8	(755.1; 891.0)	40.4	5.19	over
	Market Model	797.0	-	-	-	18.0	2.31	over
Benchmark Models	CD Original Main Model	818.5	712.7	918.8	(758.9; 884.3)	39.5	5.07	over
	BSB Original Main Model	806.6	696.4	910.1	(745.2; 875.0)	27.6	3.55	over
	10-Year Average Index	840.2	676.5	988.5	(676.5; 988.5)	61.2	7.85	over
	30-Year Average Index	828.3	676.5	988.5	(676.5; 988.5)	49.3	6.33	over
	50-Year Average Index	869.2	676.5	1178.5	(678.0; 1067.0)	90.2	11.58	over
	Market Model	797.0	-	-	-	18.0	2.31	over

Tables C.1 & C.2: Index Forecast Values and Errors for HDD January and February 2011 contracts.

<sup>2</sup> CME monthly temperature contract codes: The first letter *H* or *K* denotes a HDD or CDD contract, respectively. The number *4* denotes the New LaGuardia weather station location. The contract month is denoted as follows: *F*= Jan, *G*= Feb, *H* = Mar, *J* = Apr, *K* = May, *M* = Jun, *N* = Jul, *Q* = Aug, *U* = Sep, *V* = Oct, *X* = Nov, and *Z* = Dec. The final numbers represent the contract year.

HDDMar11 - H4H11		Actual Index		716.0						
		3-month ahead forecasts:		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast
CD Submodels	CD Submodel 1	672.9	590.1	777.9	(615.0; 734.8)	43.1	6.02	under		
	CD Submodel 2	657.9	575.1	762.9	(600.0; 719.8)	58.1	8.12	under		
	CD Submodel 3	672.2	579.3	790.1	(607.3; 741.7)	43.8	6.11	under		
	CD Submodel 4	657.5	564.5	775.3	(592.5; 727.0)	58.5	8.17	under		
	CD Submodel 5	718.6	634.0	825.7	(659.6; 782.0)	2.6	0.36	under		
	CD Submodel 6	712.7	617.7	833.0	(646.5; 784.0)	3.3	0.46	under		
BSB Submodels	BSB Submodel 7	666.1	577.1	778.9	(604.0; 732.7)	49.9	6.98	under		
	BSB Submodel 8	650.9	561.9	763.7	(588.8; 717.5)	65.1	9.10	under		
	BSB Submodel 9	666.0	570.6	787.0	(599.3; 737.3)	50.0	6.98	under		
	BSB Submodel 10	650.8	555.4	771.8	(584.1; 722.2)	65.2	9.10	under		
	BSB Submodel 11	693.4	604.9	805.6	(631.8; 759.7)	22.6	3.16	under		
	BSB Submodel 12a	697.2	601.0	818.9	(630.1; 769.4)	18.8	2.63	under		
Benchmark Models	BSB Submodel 12b	693.9	597.7	815.6	(626.8; 766.1)	22.1	3.08	under		
	CD Original Main Model	669.6	586.7	774.8	(611.7; 731.6)	46.4	6.48	under		
	BSB Original Main Model	688.8	599.7	801.8	(626.6; 755.5)	27.2	3.80	under		
	10-Year Average Index	689.2	526.0	816.5	(526.0; 816.5)	26.8	3.74	under		
	30-Year Average Index	697.3	526.0	920.5	(526.0; 920.5)	18.7	2.62	under		
	50-Year Average Index	714.2	526.0	920.5	(557.0; 846.0)	1.9	0.26	under		
Market Model	672.0	-	-	-	44.0	6.15	under			

HDDApr11 - H4J11		Actual Index		358.5						
		4-month ahead forecasts:		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast
CD Submodels	CD Submodel 1	345.8	265.8	443.6	(294.3; 399.0)	12.7	3.55	under		
	CD Submodel 2	331.4	251.4	428.8	(280.4; 384.1)	27.1	7.55	under		
	CD Submodel 3	345.4	256.3	453.8	(288.7; 403.7)	13.1	3.66	under		
	CD Submodel 4	331.5	242.7	439.8	(275.6; 389.4)	27.0	7.54	under		
	CD Submodel 5	386.1	302.3	489.2	(332.5; 442.2)	27.6	7.70	over		
	CD Submodel 6	391.5	298.5	505.7	(331.6; 453.3)	33.0	9.20	over		
BSB Submodels	BSB Submodel 7	339.3	256.7	441.3	(286.2; 394.2)	19.2	5.35	under		
	BSB Submodel 8	325.0	242.6	426.5	(272.3; 379.7)	33.5	9.35	under		
	BSB Submodel 9	341.1	250.6	451.9	(283.8; 400.6)	17.4	4.84	under		
	BSB Submodel 10	327.0	236.7	437.6	(270.3; 386.0)	31.5	8.79	under		
	BSB Submodel 11	362.2	279.1	464.9	(308.7; 417.6)	3.7	1.02	over		
	BSB Submodel 12a	367.1	271.7	483.7	(306.5; 429.8)	8.6	2.39	over		
Benchmark Models	BSB Submodel 12b	363.9	268.6	480.5	(303.5; 426.6)	5.4	1.52	over		
	CD Original Main Model	342.3	262.3	440.1	(290.9; 395.4)	16.2	4.51	under		
	BSB Original Main Model	355.1	272.0	457.4	(301.9; 410.2)	3.4	0.94	under		
	10-Year Average Index	347.2	221.0	481.0	(221.0; 481.0)	11.3	3.15	under		
	30-Year Average Index	368.6	221.0	481.0	(221.0; 481.0)	10.1	2.80	over		
	50-Year Average Index	389.8	221.0	537.0	(271.0; 524.5)	31.3	8.72	over		
Market Model	338.0	-	-	-	20.5	5.72	under			

Tables C.3 & C.4: Index Forecast Values and Errors for HDD March and April 2011 contracts.

HDDOct11 - H4V11		Actual Index		229.5						
		10-month ahead forecasts:		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast
CD Submodels	CD Submodel 1	176.6	106.2	268.4	(130.7; 223.9)	52.9	23.07	under		
	CD Submodel 2	163.8	94.7	253.8	(119.3; 209.9)	65.7	28.65	under		
	CD Submodel 3	180.5	122.2	244.0	(130.7; 232.8)	49.0	21.35	under		
	CD Submodel 4	168.1	92.5	266.4	(120.3; 218.8)	61.4	26.75	under		
	CD Submodel 5	168.6	100.4	256.6	(124.6; 213.0)	60.9	26.53	under		
	CD Submodel 6	178.4	103.4	275.1	(130.6; 227.5)	51.1	22.25	under		
BSB Submodels	BSB Submodel 7	170.9	102.1	259.9	(126.3; 216.6)	58.6	25.53	under		
	BSB Submodel 8	158.0	90.3	245.1	(115.1; 201.9)	71.5	31.16	under		
	BSB Submodel 9	179.4	103.4	278.2	(130.4; 230.6)	50.1	21.81	under		
	BSB Submodel 10	166.7	92.1	263.4	(119.6; 216.3)	62.8	27.37	under		
	BSB Submodel 11	151.0	87.2	233.0	(110.7; 192.1)	78.5	34.20	under		
	BSB Submodel 12a	176.6	104.3	269.6	(130.1; 224.0)	52.9	23.06	under		
Benchmark Models	BSB Submodel 12b	173.3	101.2	265.9	(127.3; 220.2)	56.2	24.49	under		
	CD Original Main Model	180.4	109.7	272.7	(134.3; 227.9)	49.1	21.41	under		
	BSB Original Main Model	173.6	104.6	262.8	(128.6; 219.1)	55.9	24.36	under		
	10-Year Average Index	220.7	95.0	302.5	(95.0; 302.5)	8.8	3.85	under		
	30-Year Average Index	228.7	95.0	381.5	(95.0; 381.5)	0.8	0.37	under		
	50-Year Average Index	239.9	95.0	396.5	(106.0; 381.5)	10.4	4.52	over		
Market Model	222.0	-	-	-	7.5	3.27	under			

HDDNov11 - H4X11		Actual Index		388.5						
		11-month ahead forecasts:		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast
CD Submodels	CD Submodel 1	474.6	397.0	596.4	(417.8; 531.6)	86.1	22.17	over		
	CD Submodel 2	458.9	381.6	580.7	(402.0; 516.0)	70.4	18.13	over		
	CD Submodel 3	475.6	389.7	612.5	(412.1; 540.2)	87.1	22.41	over		
	CD Submodel 4	460.1	374.2	597.0	(396.5; 524.7)	71.6	18.43	over		
	CD Submodel 5	487.3	408.5	610.9	(429.5; 545.4)	98.8	25.42	over		
	CD Submodel 6	497.8	411.6	634.1	(434.1; 562.0)	109.3	28.13	over		
BSB Submodels	BSB Submodel 7	470.4	391.5	594.8	(412.3; 529.0)	81.9	21.08	over		
	BSB Submodel 8	454.4	376.1	578.8	(396.6; 513.2)	65.9	16.98	over		
	BSB Submodel 9	467.6	381.9	604.2	(404.5; 532.2)	79.1	20.37	over		
	BSB Submodel 10	451.7	365.9	588.2	(388.5; 516.2)	63.2	16.28	over		
	BSB Submodel 11	465.6	390.4	584.2	(410.3; 521.4)	77.1	19.85	over		
	BSB Submodel 12a	478.2	393.7	612.8	(415.7; 541.8)	89.7	23.10	over		
Benchmark Models	BSB Submodel 12b	474.1	389.6	608.7	(411.7; 537.7)	85.6	22.05	over		
	CD Original Main Model	478.8	401.1	600.6	(421.9; 535.8)	90.3	23.23	over		
	BSB Original Main Model	490.1	410.9	614.8	(431.9; 548.8)	101.6	26.15	over		
	10-Year Average Index	451.1	346.5	557.0	(346.5; 557.0)	62.6	16.11	over		
	30-Year Average Index	492.4	346.5	633.0	(346.5; 633.0)	103.9	26.73	over		
	50-Year Average Index	511.6	346.5	670.0	(347.5; 661.5)	123.1	31.69	over		
Market Model	461.0	-	-	-	72.5	18.66	over			

Tables C.5 & C.6: Index Forecast Values and Errors for HDD October and November 2011 contracts.

HDDDec11 - H4Z11		Actual Index							673.0
		12-month ahead forecasts:							
		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast	
CD Submodels	CD Submodel 1	786.5	670.7	897.5	(725.2; 849.3)	113.5	16.86	over	
	CD Submodel 2	770.1	654.3	881.1	(708.7; 833.0)	97.1	14.43	over	
	CD Submodel 3	788.0	656.2	914.3	(718.2; 859.6)	115.0	17.09	over	
	CD Submodel 4	771.8	640.0	898.2	(702.0; 843.4)	98.8	14.68	over	
	CD Submodel 5	794.6	680.2	904.0	(733.3; 857.0)	121.6	18.06	over	
	CD Submodel 6	798.5	671.6	919.9	(730.5; 867.7)	125.5	18.64	over	
BSB Submodels	BSB Submodel 7	785.7	667.2	899.2	(722.6; 850.2)	112.7	16.74	over	
	BSB Submodel 8	769.0	650.5	882.6	(705.9; 833.5)	96.0	14.26	over	
	BSB Submodel 9	785.3	651.6	913.6	(714.7; 857.8)	112.3	16.69	over	
	BSB Submodel 10	768.7	634.9	896.9	(698.0; 841.1)	95.7	14.21	over	
	BSB Submodel 11	769.6	655.4	879.0	(708.9; 831.7)	96.6	14.35	over	
	BSB Submodel 12a	774.8	644.5	899.6	(705.4; 845.8)	101.8	15.13	over	
	BSB Submodel 12b	770.4	640.1	895.2	(701.0; 841.3)	97.4	14.47	over	
Benchmark Models	CD Original Main Model	789.4	673.6	900.3	(728.0; 852.2)	116.4	17.29	over	
	BSB Original Main Model	789.7	670.9	903.5	(726.4; 854.4)	116.7	17.34	over	
	10-Year Average Index	807.9	608.0	930.0	(608.0; 930.0)	134.9	20.04	over	
	30-Year Average Index	820.5	608.0	1205.5	(608.0; 1205.5)	147.5	21.91	over	
	50-Year Average Index	851.4	608.0	1205.5	(632.5; 1068.5)	178.4	26.51	over	
	Market Model	805.0	-	-	-	132.0	19.61	over	

HDDJan12 - H4F12		Actual Index							852.0
		13-month ahead forecasts:							
		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast	
CD Submodels	CD Submodel 1	956.5	860.5	1065.0	(890.7; 1022.7)	104.5	12.27	over	
	CD Submodel 2	940.0	844.0	1048.6	(874.2; 1006.2)	88.0	10.33	over	
	CD Submodel 3	958.1	849.6	1080.5	(883.8; 1032.8)	106.1	12.45	over	
	CD Submodel 4	941.8	833.3	1064.2	(867.5; 1016.4)	89.8	10.54	over	
	CD Submodel 5	947.0	857.3	1047.9	(885.8; 1008.4)	95.0	11.15	over	
	CD Submodel 6	939.9	839.3	1053.0	(871.2; 1009.0)	87.9	10.32	over	
BSB Submodels	BSB Submodel 7	957.0	860.7	1065.6	(891.1; 1023.3)	105.0	12.33	over	
	BSB Submodel 8	940.2	843.9	1048.8	(874.2; 1006.5)	88.2	10.35	over	
	BSB Submodel 9	959.0	848.4	1060.0	(883.3; 1035.1)	107.0	12.56	over	
	BSB Submodel 10	942.2	831.5	1067.0	(866.4; 1018.3)	90.2	10.58	over	
	BSB Submodel 11	919.3	825.6	1025.0	(855.1; 983.8)	67.3	7.90	over	
	BSB Submodel 12a	938.6	834.8	1055.4	(867.8; 1009.6)	86.6	10.16	over	
	BSB Submodel 12b	933.9	830.2	1051.0	(863.2; 1005.0)	81.9	9.62	over	
Benchmark Models	CD Original Main Model	956.7	860.6	1065.2	(890.8; 1022.8)	104.7	12.29	over	
	BSB Original Main Model	931.3	834.8	1040.1	(865.2; 997.7)	79.3	9.30	over	
	10-Year Average Index	965.0	727.5	1220.5	(727.5; 1220.5)	113.0	13.26	over	
	30-Year Average Index	983.5	727.5	1250.5	(727.5; 1250.5)	131.5	15.44	over	
	50-Year Average Index	1010.3	727.5	1323.5	(741.5; 1250.5)	158.3	18.58	over	
	Market Model	785.0	-	-	-	67.0	7.86	under	

Tables C.7 & C.8: Index Forecast Values and Errors for HDD December 2011 and HDD January 2012 contracts.

HDDFeb12 - H4G12		Actual Index							683.5
		14-month ahead forecasts:							
		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast	
CD Submodels	CD Submodel 1	846.8	743.3	934.0	(783.5; 907.6)	163.3	23.89	over	
	CD Submodel 2	831.2	727.7	918.4	(767.9; 892.1)	147.7	21.61	over	
	CD Submodel 3	847.4	731.0	945.5	(776.2; 915.9)	163.9	23.98	over	
	CD Submodel 4	832.0	715.5	930.1	(760.8; 900.5)	148.5	21.73	over	
	CD Submodel 5	856.5	758.4	938.6	(796.6; 914.4)	173.0	25.31	over	
	CD Submodel 6	845.8	735.0	938.6	(778.1; 911.2)	162.3	23.74	over	
BSB Submodels	BSB Submodel 7	843.8	737.0	933.4	(778.6; 906.8)	160.3	23.45	over	
	BSB Submodel 8	827.9	721.1	917.5	(762.7; 890.9)	144.4	21.13	over	
	BSB Submodel 9	842.4	723.4	942.6	(769.7; 912.4)	158.9	23.25	over	
	BSB Submodel 10	826.4	708.0	926.8	(753.8; 896.5)	142.9	20.91	over	
	BSB Submodel 11	828.7	723.7	916.9	(764.7; 890.8)	145.3	21.25	over	
	BSB Submodel 12a	849.8	737.8	943.8	(781.4; 915.9)	166.3	24.33	over	
	BSB Submodel 12b	845.3	733.3	939.3	(776.8; 911.4)	161.8	23.67	over	
Benchmark Models	CD Original Main Model	817.5	717.6	900.3	(756.0; 877.0)	134.0	19.60	over	
	BSB Original Main Model	805.5	702.5	890.6	(742.2; 866.7)	122.0	17.85	over	
	10-Year Average Index	840.2	676.5	988.5	(676.5; 988.5)	156.7	22.92	over	
	30-Year Average Index	828.3	676.5	988.5	(676.5; 988.5)	144.8	21.19	over	
	50-Year Average Index	869.2	676.5	1178.5	(678.0; 1067.0)	185.7	27.16	over	
	Market Model	680.0	-	-	-	3.5	0.51	under	

HDDMar12 - H4H12		Actual Index							440.5
		15-month ahead forecasts:							
		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast	
CD Submodels	CD Submodel 1	665.3	566.6	773.1	(604.3; 730.9)	224.8	51.02	over	
	CD Submodel 2	648.4	549.6	756.2	(587.4; 714.0)	207.9	47.19	over	
	CD Submodel 3	664.8	554.2	785.6	(596.4; 738.3)	224.3	50.92	over	
	CD Submodel 4	648.1	537.5	769.0	(579.7; 721.7)	207.6	47.14	over	
	CD Submodel 5	713.5	611.6	825.3	(651.6; 781.0)	273.0	61.99	over	
	CD Submodel 6	708.2	593.9	833.4	(638.5; 783.8)	267.7	60.77	over	
BSB Submodels	BSB Submodel 7	658.4	552.3	774.5	(593.0; 729.0)	217.9	49.47	over	
	BSB Submodel 8	641.3	535.1	757.4	(575.8; 711.8)	200.8	45.58	over	
	BSB Submodel 9	658.5	544.9	783.0	(588.3; 734.0)	218.0	49.49	over	
	BSB Submodel 10	641.0	527.7	765.5	(571.1; 716.9)	200.5	45.52	over	
	BSB Submodel 11	682.9	577.1	798.6	(617.9; 753.1)	242.4	55.02	over	
	BSB Submodel 12a	690.8	574.8	818.6	(620.7; 767.5)	250.3	56.83	over	
	BSB Submodel 12b	685.9	569.8	813.0	(615.9; 762.6)	245.4	55.71	over	
Benchmark Models	CD Original Main Model	669.4	570.3	774.2	(608.5; 733.1)	228.9	51.95	over	
	BSB Original Main Model	688.5	582.3	801.1	(623.2; 757.0)	248.0	56.30	over	
	10-Year Average Index	689.2	526.0	816.5	(526.0; 816.5)	248.7	56.46	over	
	30-Year Average Index	697.3	526.0	920.5	(526.0; 920.5)	256.8	58.29	over	
	50-Year Average Index	714.2	526.0	920.5	(557.0; 846.0)	273.0	62.12	over	
	Market Model	660.0	-	-	-	219.5	49.83	over	

Tables C.9 & C.10: Index Forecast Values and Errors for HDD February and HDD March 2012 contracts.

HDDApr12		Actual Index	298.0					
		16-month ahead forecasts:						
		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast
CD Submodels	CD Submodel 1	336.9	246.2	442.0	(284.2; 390.4)	38.9	5.44	over
	CD Submodel 2	320.8	230.6	425.3	(268.7; 374.2)	22.8	3.19	over
	CD Submodel 3	336.6	236.5	453.4	(278.7; 396.0)	38.6	5.40	over
	CD Submodel 4	321.0	221.2	437.6	(263.7; 380.1)	23.0	3.21	over
	CD Submodel 5	378.3	282.2	488.4	(322.4; 434.4)	80.3	11.22	over
	CD Submodel 6	384.0	278.2	505.9	(322.8; 446.0)	86.0	12.01	over
BSB Submodels	BSB Submodel 7	330.4	236.2	438.4	(276.2; 385.6)	32.4	4.53	over
	BSB Submodel 8	314.3	220.5	421.9	(260.5; 369.2)	16.3	2.28	over
	BSB Submodel 9	332.5	230.5	451.3	(273.9; 392.9)	34.5	4.81	over
	BSB Submodel 10	316.5	214.8	435.1	(258.2; 376.5)	18.5	2.59	over
	BSB Submodel 11	349.2	253.9	444.7	(294.2; 404.8)	51.2	7.15	over
	BSB Submodel 12a	358.7	251.1	483.4	(296.6; 422.2)	60.7	8.47	over
	BSB Submodel 12b	354.0	246.5	478.6	(292.1; 417.5)	56.0	7.81	over
Benchmark Models	CD Original Main Model	341.0	253.0	445.0	(286.9; 396.1)	43.0	6.01	over
	BSB Original Main Model	353.8	261.2	461.9	(296.9; 410.6)	55.8	7.80	over
	10-Year Average Index	347.2	221.0	481.0	(221.0; 481.0)	49.2	6.87	over
	30-Year Average Index	368.6	221.0	481.0	(221.0; 481.0)	70.6	9.85	over
	50-Year Average Index	389.8	221.0	537.0	(271.0; 524.5)	91.8	12.82	over
	Market Model	330.0	-	-	-	32.0	4.47	over

CDDApr11 - K4J11		Actual Index	0.5					
		4-month ahead forecasts:						
		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast
CD Submodels	CD Submodel 1	1.8	0.0	22.1	(0.0; 8.9)	1.3	267.84	over
	CD Submodel 2	2.3	0.0	24.6	(0.0; 10.2)	1.8	357.95	over
	CD Submodel 3	3.2	0.0	29.9	(0.0; 12.5)	2.7	531.77	over
	CD Submodel 4	3.8	0.0	32.3	(0.0; 14.0)	3.3	660.62	over
	CD Submodel 5	1.4	0.0	19.3	(0.0; 7.6)	0.9	178.25	over
	CD Submodel 6	2.1	0.0	25.1	(0.0; 10.3)	1.6	328.51	over
BSB Submodels	BSB Submodel 7	2.2	0.0	12.0	(0.0; 9.8)	1.7	337.82	over
	BSB Submodel 8	2.7	0.0	26.2	(0.0; 11.0)	2.2	442.90	over
	BSB Submodel 9	3.6	0.0	31.5	(0.0; 13.4)	3.1	610.50	over
	BSB Submodel 10	4.3	0.0	43.1	(0.0; 14.9)	3.8	753.27	over
	BSB Submodel 11	1.9	0.0	22.3	(0.0; 9.0)	1.4	270.38	over
	BSB Submodel 12a	3.4	0.0	16.4	(0.0; 13.2)	2.9	570.79	over
	BSB Submodel 12b	3.5	0.0	31.9	(0.0; 13.5)	3.0	597.52	over
Benchmark Models	CD Original Main Model	1.9	0.0	22.6	(0.0; 9.2)	1.4	285.87	over
	BSB Original Main Model	2.0	0.0	23.1	(0.0; 9.4)	1.5	300.20	over
	10-Year Average Index	14.5	0.0	57.0	(0.0; 57.0)	14.0	2790.00	over
	30-Year Average Index	7.7	0.0	57.0	(0.0; 57.0)	7.2	1443.33	over
	50-Year Average Index	6.8	0.0	57.0	(0.0; 43.0)	6.3	1262.00	over
	Market Model	13.0	-	-	-	12.5	2500.00	over

Tables C.11 & C.12: Index Forecast Values and Errors for HDD April 2012 and CDD April 2011 contracts.

CDDMay11 - K4K11		Actual Index	70.0					
		5-month ahead forecasts:						
		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast
CD Submodels	CD Submodel 1	54.4	14.4	98.3	(28.4; 84.5)	15.6	22.30	under
	CD Submodel 2	61.2	17.2	107.7	(33.5; 92.6)	8.8	12.62	under
	CD Submodel 3	62.4	16.8	112.9	(32.5; 97.1)	7.6	10.87	under
	CD Submodel 4	69.2	19.8	122.6	(38.1; 105.2)	0.8	1.16	under
	CD Submodel 5	55.2	14.6	98.8	(28.9; 85.0)	14.8	21.13	under
	CD Submodel 6	56.7	14.7	103.7	(28.9; 89.5)	13.3	19.01	under
BSB Submodels	BSB Submodel 7	54.7	14.7	97.5	(29.3; 83.9)	15.3	21.80	under
	BSB Submodel 8	61.7	17.7	106.8	(34.9; 92.4)	8.3	11.79	under
	BSB Submodel 9	63.9	17.4	115.1	(33.6; 99.0)	6.1	8.65	under
	BSB Submodel 10	70.9	20.4	125.1	(39.5; 107.4)	0.9	1.33	over
	BSB Submodel 11	64.3	18.7	110.0	(36.7; 95.3)	5.7	8.13	under
	BSB Submodel 12a	61.3	16.4	111.2	(31.7; 96.0)	8.7	12.38	under
	BSB Submodel 12b	62.8	17.0	113.3	(32.8; 97.8)	7.2	10.23	under
Benchmark Models	CD Original Main Model	55.4	14.8	99.7	(29.2; 85.6)	14.6	20.88	under
	BSB Original Main Model	66.4	19.6	112.3	(38.5; 97.3)	3.6	5.11	under
	10-Year Average Index	62.8	8.0	129.5	(8.0; 129.5)	7.2	10.29	under
	30-Year Average Index	61.5	3.0	179.0	(3.0; 179.0)	8.6	12.21	under
	50-Year Average Index	55.3	3.0	179.0	(4.0; 129.5)	14.7	20.96	under
	Market Model	58.0	-	-	-	12.0	17.14	under

CDDJun11 - K4M11		Actual Index	234.5					
		6-month ahead forecasts:						
		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast
CD Submodels	CD Submodel 1	243.5	162.9	340.2	(195.9; 291.6)	9.0	3.82	over
	CD Submodel 2	257.8	176.7	355.0	(210.3; 306.2)	23.3	9.92	over
	CD Submodel 3	247.7	157.9	355.4	(194.7; 301.5)	13.2	5.63	over
	CD Submodel 4	261.5	171.3	370.2	(207.9; 315.6)	27.0	11.52	over
	CD Submodel 5	249.8	170.0	345.7	(203.0; 297.4)	15.3	6.51	over
	CD Submodel 6	247.4	160.4	352.0	(195.7; 299.5)	12.9	5.52	over
BSB Submodels	BSB Submodel 7	248.7	172.1	340.7	(204.0; 294.2)	14.2	6.04	over
	BSB Submodel 8	263.2	186.4	355.9	(217.9; 309.1)	28.7	12.23	over
	BSB Submodel 9	254.2	165.5	360.8	(201.7; 307.5)	19.7	8.42	over
	BSB Submodel 10	268.4	179.2	375.9	(215.5; 321.7)	33.9	14.47	over
	BSB Submodel 11	270.2	192.6	364.3	(224.1; 316.7)	35.7	15.24	over
	BSB Submodel 12a	247.1	161.0	350.3	(196.2; 298.8)	12.6	5.39	over
	BSB Submodel 12b	250.4	164.2	353.8	(199.4; 302.0)	15.9	6.79	over
Benchmark Models	CD Original Main Model	245.0	164.7	341.6	(197.67; 293.0)	10.5	4.49	over
	BSB Original Main Model	270.9	194.2	364.1	(255.1; 316.8)	36.4	15.53	over
	10-Year Average Index	254.2	126.5	329.0	(126.5; 329.0)	19.7	8.40	over
	30-Year Average Index	237.1	106.0	329.0	(106.0; 329.0)	2.6	1.10	over
	50-Year Average Index	218.4	71.0	329.0	(106.0; 322.0)	16.1	6.88	under
	Market Model	259.0	-	-	-	24.5	10.45	over

Tables C.13 & C.14: Index Forecast Values and Errors for CDD May 2011 and CDD June 2011 contracts.

<b>CDDJul11 - K4N11</b>		<b>Actual Index</b>		<b>478.5</b>				
		<b>7-month ahead forecasts:</b>						
		<i>Mean</i>	<i>Min</i>	<i>Max</i>	<i>95% CI</i>	<i>AE</i>	<i>APE</i>	<i>Under/Overforecast</i>
<i>CD Submodels</i>	CD Submodel 1	423.0	361.7	486.6	(378.6; 466.9)	55.5	11.60	under
	CD Submodel 2	439.1	377.5	502.4	(394.4; 482.7)	39.4	8.23	under
	CD Submodel 3	425.1	357.1	494.8	(375.8; 473.0)	53.4	11.16	under
	CD Submodel 4	440.6	372.6	510.2	(391.2; 488.5)	37.9	7.92	under
	CD Submodel 5	409.3	348.4	471.8	(365.0; 452.4)	69.2	14.46	under
	CD Submodel 6	414.8	346.8	484.5	(365.7; 462.8)	63.7	13.31	under
<i>BSB Submodels</i>	BSB Submodel 7	429.8	370.7	490.4	(386.9; 471.5)	48.7	10.18	under
	BSB Submodel 8	445.7	386.6	506.3	(402.8; 487.3)	32.8	6.86	under
	BSB Submodel 9	427.0	363.7	491.5	(380.9; 471.6)	51.5	10.77	under
	BSB Submodel 10	442.8	379.6	507.4	(396.8; 487.4)	35.7	7.46	under
	BSB Submodel 11	430.1	371.3	490.3	(387.4; 471.6)	48.4	10.12	under
	BSB Submodel 12a	426.1	362.7	491.0	(380.0; 470.8)	52.4	10.95	under
	BSB Submodel 12b	429.9	366.4	494.8	(383.7; 474.6)	48.6	10.16	under
<i>Benchmark Models</i>	CD Original Main Model	423.6	362.0	486.6	(378.9; 466.9)	54.9	11.48	under
	BSB Original Main Model	423.1	364.0	483.7	(380.2; 464.7)	55.4	11.58	under
	10-Year Average Index	409.4	293.5	551.5	(293.5; 551.5)	69.1	14.45	under
	30-Year Average Index	392.7	263.0	551.5	(263.0; 551.5)	85.8	17.92	under
	50-Year Average Index	375.1	253.5	551.5	(263.0; 524.5)	103.4	21.61	under
	Market Model	404.0	-	-	-	74.5	15.57	under

<b>CDDAug11 - K4Q11</b>		<b>Actual Index</b>		<b>341.0</b>				
		<b>8-month ahead forecasts:</b>						
		<i>Mean</i>	<i>Min</i>	<i>Max</i>	<i>95% CI</i>	<i>AE</i>	<i>APE</i>	<i>Under/Overforecast</i>
<i>CD Submodels</i>	CD Submodel 1	393.0	322.0	460.4	(352.9; 452.1)	52.0	15.24	over
	CD Submodel 2	408.9	337.9	476.3	(368.8; 451.0)	67.9	19.90	over
	CD Submodel 3	394.4	316.1	468.7	(350.1; 440.8)	53.4	15.67	over
	CD Submodel 4	410.0	331.7	484.3	(365.8; 456.5)	69.0	20.25	over
	CD Submodel 5	380.1	311.9	444.8	(341.7; 420.5)	39.1	11.48	over
	CD Submodel 6	389.8	313.0	462.5	(346.5; 435.1)	48.8	14.30	over
<i>BSB Submodels</i>	BSB Submodel 7	397.2	329.9	461.2	(359.2; 437.2)	56.2	16.49	over
	BSB Submodel 8	413.2	346.0	477.2	(375.3; 453.2)	72.2	21.18	over
	BSB Submodel 9	398.0	325.1	466.4	(356.8; 440.6)	57.0	16.72	over
	BSB Submodel 10	413.6	341.2	482.4	(372.8; 456.6)	72.6	21.29	over
	BSB Submodel 11	399.8	334.3	461.8	(363.0; 438.4)	58.8	17.23	over
	BSB Submodel 12a	403.6	332.5	471.1	(363.5; 445.7)	62.6	18.36	over
	BSB Submodel 12b	407.5	336.4	475.0	(367.4; 449.6)	66.5	19.50	over
<i>Benchmark Models</i>	CD Original Main Model	390.9	320.0	458.3	(350.9; 433.0)	49.9	14.64	over
	BSB Original Main Model	384.1	316.7	448.0	(346.0; 424.0)	43.1	12.63	over
	10-Year Average Index	401.8	309.5	492.5	(309.5; 492.5)	60.8	17.84	over
	30-Year Average Index	359.8	234.0	492.5	(234.0; 492.5)	18.8	5.51	over
	50-Year Average Index	343.8	234.0	492.5	(242.0; 459.5)	2.8	0.83	over
	Market Model	385.0	-	-	-	44.0	12.90	over

Tables C.15 & C.16: Index Forecast Values and Errors for CDD July 2011 and CDD August 2011 contracts.

<b>CDDSep11 - K4U11</b>		<b>Actual Index</b>		<b>190.0</b>				
		<b>9-month ahead forecasts:</b>						
		<i>Mean</i>	<i>Min</i>	<i>Max</i>	<i>95% CI</i>	<i>AE</i>	<i>APE</i>	<i>Under/Overforecast</i>
<i>CD Submodels</i>	CD Submodel 1	172.8	112.2	252.1	(132.1; 217.2)	17.2	9.06	under
	CD Submodel 2	186.0	122.5	267.1	(144.3; 230.6)	4.0	2.09	under
	CD Submodel 3	177.2	113.0	264.5	(133.3; 226.6)	12.7	6.72	under
	CD Submodel 4	190.0	122.7	279.2	(144.7; 239.3)	0.0	0.01	-
	CD Submodel 5	179.5	118.9	255.2	(140.6; 220.9)	10.5	5.54	under
	CD Submodel 6	185.4	120.7	269.1	(142.3; 231.6)	4.6	2.42	under
<i>BSB Submodels</i>	BSB Submodel 7	173.9	114.7	249.1	(135.3; 215.5)	16.1	8.49	under
	BSB Submodel 8	187.5	125.3	264.2	(147.9; 229.3)	2.5	1.32	under
	BSB Submodel 9	180.8	116.8	265.8	(137.3; 228.3)	9.2	4.83	under
	BSB Submodel 10	194.1	127.3	280.9	(149.5; 241.6)	4.1	2.15	over
	BSB Submodel 11	195.4	133.1	270.4	(157.3; 235.2)	5.4	2.84	over
	BSB Submodel 12a	182.8	120.6	261.6	(142.4; 226.3)	7.2	3.78	under
	BSB Submodel 12b	186.2	123.2	265.4	(145.6; 229.9)	3.8	2.00	under
<i>Benchmark Models</i>	CD Original Main Model	169.6	109.7	248.4	(129.3; 214.0)	20.4	10.72	under
	BSB Original Main Model	177.1	117.1	253.1	(138.2; 219.0)	12.9	6.78	under
	10-Year Average Index	188.5	114.5	301.5	(114.5; 301.5)	1.5	0.79	under
	30-Year Average Index	162.1	95.5	301.5	(95.5; 301.5)	27.9	14.66	under
	50-Year Average Index	152.7	42.5	301.5	(72.5; 280.5)	37.3	19.63	under
	Market Model	187.0	-	-	-	3.0	1.58	under

<b>CDDOct11 - K4V11</b>		<b>Actual Index</b>		<b>22.0</b>				
		<b>10-month ahead forecasts:</b>						
		<i>Mean</i>	<i>Min</i>	<i>Max</i>	<i>95% CI</i>	<i>AE</i>	<i>APE</i>	<i>Under/Overforecast</i>
<i>CD Submodels</i>	CD Submodel 1	18.7	0.1	54.6	(3.8; 37.6)	3.3	14.79	under
	CD Submodel 2	22.1	0.7	60.0	(5.4; 42.4)	0.1	0.43	over
	CD Submodel 3	23.1	0.4	64.3	(5.3; 45.0)	1.1	4.86	over
	CD Submodel 4	26.7	1.4	69.9	(7.1; 50.4)	4.7	21.14	over
	CD Submodel 5	19.6	0.0	54.4	(4.7; 38.1)	2.4	11.05	under
	CD Submodel 6	22.4	0.6	61.6	(5.3; 43.1)	0.4	1.63	over
<i>BSB Submodels</i>	BSB Submodel 7	18.1	0.2	52.1	(3.7; 36.0)	3.9	17.82	under
	BSB Submodel 8	21.5	0.9	57.8	(5.5; 40.9)	0.5	2.17	under
	BSB Submodel 9	21.9	0.4	61.7	(4.7; 42.8)	0.1	0.32	under
	BSB Submodel 10	25.5	1.4	67.4	(6.7; 48.4)	3.5	16.10	over
	BSB Submodel 11	22.5	0.9	58.1	(6.5; 41.7)	0.5	2.11	over
	BSB Submodel 12a	19.3	0.4	55.1	(4.1; 38.2)	2.7	12.17	under
	BSB Submodel 12b	20.2	0.5	56.5	(4.5; 39.4)	1.8	8.33	under
<i>Benchmark Models</i>	CD Original Main Model	17.9	0.0	53.2	(3.2; 36.1)	4.1	18.84	under
	BSB Original Main Model	18.7	0.0	53.3	(4.3; 37.0)	3.3	14.92	under
	10-Year Average Index	30.9	4.5	109.5	(4.5; 109.5)	8.9	40.45	over
	30-Year Average Index	24.2	0.0	109.5	(0.0; 109.5)	2.2	10.00	over
	50-Year Average Index	20.2	0.0	109.5	(0.0; 92.5)	1.8	8.18	under
	Market Model	31.0	-	-	-	9.0	40.91	over

Tables C.17 & C.18: Index Forecast Values and Errors for CDD September 2011 and CDD October 2011 contracts.

CDDApr12 - K4J12		Actual Index							18.0
		16-month ahead forecasts:							
		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast	
CD Submodels	CD Submodel 1	1.9	0.0	21.1	(0.0; 8.6)	16.1	89.34	under	
	CD Submodel 2	2.5	0.0	22.2	(0.0; 9.7)	15.5	86.23	under	
	CD Submodel 3	3.3	0.0	25.9	(0.0; 12.0)	14.7	81.59	under	
	CD Submodel 4	4.1	0.0	27.8	(0.0; 13.8)	13.9	77.29	under	
	CD Submodel 5	1.4	0.0	20.2	(0.0; 7.6)	16.6	92.26	under	
	CD Submodel 6	2.2	0.0	24.2	(0.0; 9.6)	15.8	88.03	under	
BSB Submodels	BSB Submodel 7	2.3	0.0	22.2	(0.0; 9.2)	15.7	87.28	under	
	BSB Submodel 8	2.9	0.0	23.3	(0.0; 10.7)	15.1	83.70	under	
	BSB Submodel 9	3.7	0.0	27.0	(0.0; 13.0)	14.3	79.34	under	
	BSB Submodel 10	4.6	0.0	29.3	(0.0; 14.9)	13.4	74.57	under	
	BSB Submodel 11	2.0	0.0	21.6	(0.0; 8.9)	16.0	88.64	under	
	BSB Submodel 12a	3.5	0.0	27.5	(0.0; 12.6)	14.5	80.73	under	
	BSB Submodel 12b	3.7	0.0	27.8	(0.0; 13.1)	14.3	79.54	under	
Benchmark Models	CD Original Main Model	1.9	0.0	22.6	(0.0; 8.6)	16.1	89.28	under	
	BSB Original Main Model	1.9	0.0	21.8	(0.0; 8.9)	16.1	89.43	under	
	10-Year Average Index	14.5	0.0	57.0	(0.0; 57.0)	3.6	19.72	under	
	30-Year Average Index	7.7	0.0	57.0	(0.0; 57)	10.3	57.13	under	
	50-Year Average Index	6.8	0.0	57.0	(0.0; 43.0)	11.2	62.17	under	
	Market Model	13.0	-	-	-	5.0	27.78	under	

CDDMay12 - K4K12		Actual Index							98.0
		17-month ahead forecasts:							
		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast	
CD Submodels	CD Submodel 1	58.4	21.2	115.5	(29.8; 90.4)	39.6	40.44	under	
	CD Submodel 2	66.4	25.6	126.2	(36.6; 100.6)	31.6	32.21	under	
	CD Submodel 3	66.5	24.1	131.2	(34.3; 103.3)	31.5	32.17	under	
	CD Submodel 4	74.6	29.1	142.2	(40.7; 113.2)	23.4	23.93	under	
	CD Submodel 5	58.6	21.0	115.5	(30.2; 90.6)	39.4	40.23	under	
	CD Submodel 6	59.9	20.6	121.2	(29.8; 94.0)	38.1	38.88	under	
BSB Submodels	BSB Submodel 7	58.9	21.7	114.6	(31.1; 90.2)	39.1	39.94	under	
	BSB Submodel 8	67.2	26.0	125.4	(38.0; 100.3)	30.8	31.41	under	
	BSB Submodel 9	68.2	25.1	133.8	(35.5; 105.5)	29.8	30.44	under	
	BSB Submodel 10	76.5	30.1	145.0	(42.1; 115.6)	21.5	21.95	under	
	BSB Submodel 11	70.9	27.1	130.4	(41.3; 104.4)	27.1	27.64	under	
	BSB Submodel 12a	65.0	23.0	129.6	(33.3; 101.4)	33.0	33.64	under	
	BSB Submodel 12b	67.4	24.5	132.8	(35.1; 104.3)	30.6	31.21	under	
Benchmark Models	CD Original Main Model	56.3	16.8	114.3	(29.4; 88.5)	41.7	42.58	under	
	BSB Original Main Model	67.5	24.1	126.7	(39.2; 101.0)	30.5	31.17	under	
	10-Year Average Index	62.8	8.0	129.5	(8.0; 129.5)	35.2	35.92	under	
	30-Year Average Index	61.5	3.0	179.0	(3.0; 179.0)	36.6	37.30	under	
	50-Year Average Index	55.3	3.0	179.0	(4.0; 129.5)	42.7	43.54	under	
	Market Model	58.0	-	-	-	40.0	40.82	under	

Tables C.19 & C.20: Index Forecast Values and Errors for CDD April 2012 and CDD May 2012 contracts.

CDDJun12 - K4M12		Actual Index							248.0
		18-month ahead forecasts:							
		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast	
CD Submodels	CD Submodel 1	251.3	172.9	323.4	(202.7; 298.6)	3.3	1.32	over	
	CD Submodel 2	267.4	187.1	340.4	(218.0; 315.6)	19.4	7.83	over	
	CD Submodel 3	255.4	169.6	335.7	(201.5; 307.8)	7.4	2.99	over	
	CD Submodel 4	271.1	182.9	352.5	(216.3; 324.3)	23.1	9.31	over	
	CD Submodel 5	255.5	177.1	327.0	(207.3; 302.6)	7.5	3.03	over	
	CD Submodel 6	253.3	169.7	330.9	(200.9; 304.2)	5.3	2.15	over	
BSB Submodels	BSB Submodel 7	256.6	181.1	325.2	(209.9; 301.9)	8.6	3.48	over	
	BSB Submodel 8	273.1	195.0	342.3	(225.4; 318.7)	25.1	10.11	over	
	BSB Submodel 9	262.1	176.3	342.3	(208.3; 314.3)	14.1	5.69	over	
	BSB Submodel 10	279.0	190.2	359.4	(223.8; 331.3)	30.2	12.18	over	
	BSB Submodel 11	281.3	201.8	351.8	(233.2; 327.7)	33.3	13.43	over	
	BSB Submodel 12a	254.2	171.2	331.7	(202.2; 304.8)	6.2	2.51	over	
	BSB Submodel 12b	259.1	175.4	337.0	(206.9; 309.9)	11.1	4.49	over	
Benchmark Models	CD Original Main Model	247.2	169.6	326.5	(199.3; 293.0)	0.8	0.32	under	
	BSB Original Main Model	273.2	195.5	249.8	(226.1; 317.5)	25.2	10.15	over	
	10-Year Average Index	254.2	126.5	329.0	(126.5; 329.0)	6.2	2.50	over	
	30-Year Average Index	237.1	106.0	329.0	(106.0; 329.0)	10.9	4.40	under	
	50-Year Average Index	218.4	71.0	329.0	(106.0; 322.0)	29.6	11.95	under	
	Market Model	259.0	-	-	-	11.0	4.44	over	

CDDJul12 - K4N12		Actual Index							478.5
		19-month ahead forecasts:							
		Mean	Min	Max	95% CI	AE	APE	Under/Overforecast	
CD Submodels	CD Submodel 1	427.3	336.6	486.4	(382.1; 471.5)	51.2	10.69	under	
	CD Submodel 2	445.0	354.3	504.1	(399.8; 489.2)	33.5	7.00	under	
	CD Submodel 3	429.1	329.0	494.2	(379.0; 477.8)	49.4	10.33	under	
	CD Submodel 4	446.5	346.4	511.6	(396.4; 495.2)	32.0	6.70	under	
	CD Submodel 5	410.9	321.1	469.3	(366.0; 454.6)	67.6	14.13	under	
	CD Submodel 6	416.6	316.5	481.7	(366.7; 465.2)	61.9	12.94	under	
BSB Submodels	BSB Submodel 7	433.8	346.9	490.5	(390.5; 476.1)	44.7	9.34	under	
	BSB Submodel 8	451.7	364.8	508.3	(408.4; 493.9)	26.8	5.61	under	
	BSB Submodel 9	430.8	337.7	491.2	(383.8; 476.4)	47.7	9.96	under	
	BSB Submodel 10	448.7	355.6	509.1	(401.6; 494.3)	29.8	6.23	under	
	BSB Submodel 11	437.3	350.8	493.6	(394.1; 479.5)	41.2	8.60	under	
	BSB Submodel 12a	429.5	336.0	490.2	(382.6; 475.0)	49.0	10.25	under	
	BSB Submodel 12b	435.0	341.6	495.7	(388.1; 480.5)	43.5	9.09	under	
Benchmark Models	CD Original Main Model	425.4	334.6	485.1	(383.6; 468.7)	53.1	11.09	under	
	BSB Original Main Model	425.1	337.9	482.2	(384.9; 466.6)	53.4	11.16	under	
	10-Year Average Index	409.4	293.5	551.5	(293.5; 551.5)	69.1	14.45	under	
	30-Year Average Index	392.7	263.0	551.5	(263.0; 551.5)	85.8	17.92	under	
	50-Year Average Index	375.1	253.5	551.5	(263.0; 524.5)	103.4	21.61	under	
	Market Model	259.0	-	-	-	219.5	45.87	under	

Tables C.21 & C.22: Index Forecast Values and Errors for CDD June 2012 and CDD July 2012 contracts.



<b>CDDAug12 - K4Q12</b>		<b>Actual Index</b>		<b>425.5</b>				
		<b>20-month ahead forecasts:</b>						
		<i>Mean</i>	<i>Min</i>	<i>Max</i>	<i>95% CI</i>	<i>AE</i>	<i>APE</i>	<i>Under/Overforecast</i>
<i>CD Submodels</i>	CD Submodel 1	391.1	317.0	469.0	(351.0; 435.5)	34.4	8.08	under
	CD Submodel 2	408.9	334.9	486.7	(368.9; 453.4)	16.6	3.89	under
	CD Submodel 3	392.6	310.8	478.5	(348.4; 441.5)	32.9	7.74	under
	CD Submodel 4	410.1	338.4	496.1	(366.0; 459.1)	15.4	3.62	under
	CD Submodel 5	376.9	305.7	428.0	(338.2; 419.3)	48.6	11.43	under
	CD Submodel 6	386.4	306.3	469.5	(342.9; 434.2)	39.1	9.18	under
<i>BSB Submodels</i>	BSB Submodel 7	395.4	325.1	468.9	(357.2; 437.5)	30.1	7.07	under
	BSB Submodel 8	413.4	343.2	486.9	(375.3; 455.5)	12.1	2.84	under
	BSB Submodel 9	396.0	320.5	476.4	(335.1; 441.5)	29.5	6.93	under
	BSB Submodel 10	414.0	338.6	494.4	(373.1; 459.5)	11.5	2.70	under
	BSB Submodel 11	402.2	356.4	451.2	(365.1; 442.9)	23.3	5.48	under
	BSB Submodel 12a	401.2	327.1	478.6	(360.9; 445.6)	24.3	5.70	under
	BSB Submodel 12b	406.9	332.8	484.3	(366.6; 451.3)	18.6	4.36	under
<i>Benchmark Models</i>	CD Original Main Model	392.6	325.9	467.7	(350.9; 435.9)	32.9	7.73	under
	BSB Original Main Model	385.9	322.4	457.2	(346.2; 427.1)	39.6	9.31	under
	10-Year Average Index	401.8	309.5	492.5	(309.5; 492.5)	23.7	5.56	under
	30-Year Average Index	359.8	234.0	492.5	(234.0; 492.5)	65.7	15.44	under
	50-Year Average Index	343.8	234.0	492.5	(242.0; 459.5)	81.7	19.19	under
	Market Model	259.0	-	-	-	166.5	39.13	under

<b>CDDSep12 - K4U12</b>		<b>Actual Index</b>		<b>181.0</b>				
		<b>21-month ahead forecasts:</b>						
		<i>Mean</i>	<i>Min</i>	<i>Max</i>	<i>95% CI</i>	<i>AE</i>	<i>APE</i>	<i>Under/Overforecast</i>
<i>CD Submodels</i>	CD Submodel 1	168.7	106.3	229.6	(126.9; 212.1)	12.3	6.80	under
	CD Submodel 2	183.5	119.1	246.4	(141.4; 227.8)	2.5	1.37	over
	CD Submodel 3	173.2	104.7	239.9	(126.8; 221.0)	7.8	4.31	under
	CD Submodel 4	187.5	116.8	256.5	(141.0; 236.5)	6.5	3.59	over
	CD Submodel 5	174.0	114.0	232.5	(134.9; 215.3)	7.0	3.86	under
	CD Submodel 6	179.8	113.9	244.3	(136.4; 225.5)	1.2	0.65	under
<i>BSB Submodels</i>	BSB Submodel 7	169.8	110.5	227.8	(130.4; 210.8)	11.2	6.17	under
	BSB Submodel 8	185.1	123.5	245.0	(145.5; 227.3)	4.1	2.25	over
	BSB Submodel 9	176.7	109.9	241.9	(131.8; 223.0)	4.3	2.38	under
	BSB Submodel 10	191.5	123.0	259.0	(146.5; 238.8)	10.5	5.83	over
	BSB Submodel 11	194.8	133.6	254.0	(156.3; 236.3)	13.8	7.63	over
	BSB Submodel 12a	178.0	115.8	238.7	(136.8; 220.9)	3.0	1.68	under
	BSB Submodel 12b	182.8	119.9	244.2	(141.6; 226.2)	1.8	1.02	over
<i>Benchmark Models</i>	CD Original Main Model	171.4	111.6	234.4	(130.6; 214.2)	9.6	5.28	under
	BSB Original Main Model	179.2	121.3	238.8	(139.2; 220.4)	1.8	1.01	under
	10-Year Average Index	188.5	114.5	301.5	(114.5; 301.5)	7.5	4.14	over
	30-Year Average Index	162.1	95.5	301.5	(95.5; 301.5)	18.9	10.42	under
	50-Year Average Index	152.7	42.5	301.5	(72.5; 280.5)	28.3	15.63	under
	Market Model	259.0	-	-	-	78.0	43.09	over

Tables C.23 & C.24: Index Forecast Values and Errors for CDD August 2012 and CDD September 2012 contracts.

## Appendix D: Forecast Performance Analysis Contracts

HDD Monthly Contracts		HDDJan11-12 - H4F							
		MAE	MAPE	AE 11	APE 11	Under/Overforecast	AE 12	APE 12	Under/Overforecast
CD Submodels	CD Submodel 1	86.52	9.47	68.5	6.68	under	104.5	12.27	over
	CD Submodel 2	85.42	9.20	82.8	8.07	under	88.0	10.33	over
	CD Submodel 3	86.39	9.48	66.7	6.50	under	106.1	12.45	over
	CD Submodel 4	85.31	9.21	80.9	7.88	under	89.8	10.54	over
	CD Submodel 5	87.73	9.50	80.5	7.84	under	95.0	11.15	over
	CD Submodel 6	87.51	9.40	87.1	8.49	under	87.9	10.32	over
BSB Submodels	BSB Submodel 7	90.29	9.85	75.6	7.36	under	105.0	12.33	over
	BSB Submodel 8	88.84	9.54	89.5	8.72	under	88.2	10.35	over
	BSB Submodel 9	89.98	9.84	73.0	7.11	under	107.0	12.56	over
	BSB Submodel 10	88.59	9.53	87.0	8.48	under	90.2	10.58	over
	BSB Submodel 11	88.73	9.32	110.2	10.74	under	67.3	7.90	over
	BSB Submodel 12a	90.29	9.66	94.0	9.16	under	86.6	10.16	over
	BSB Submodel 12b	89.37	9.53	96.8	9.44	under	81.9	9.62	over
Benchmark Models	CD Original Main Model	84.97	9.32	65.3	6.36	under	104.7	12.29	over
	BSB Original Main Model	90.08	9.57	100.9	9.83	under	79.3	9.30	over
	10-Year Average Index	87.00	9.60	61.1	5.95	under	113.0	13.26	over
	30-Year Average Index	87.00	9.79	42.5	4.14	under	131.5	15.44	over
	50-Year Average Index	87.00	10.05	15.7	1.53	under	158.3	18.58	over
	Market Model	39.00	4.47	11.0	1.07	under	67.0	7.86	under

Table D.1: Mean Absolute Errors and Mean Absolute Percentage Errors for HDD January contracts.

HDD Monthly Contracts		HDDFeb11-12 - H4G							
		MAE	MAPE	AE 11	APE 11	Under/Overforecast	AE 12	APE 12	Under/Overforecast
CD Submodels	CD Submodel 1	102.25	14.59	41.2	5.29	over	163.3	23.89	over
	CD Submodel 2	87.80	12.60	27.9	3.58	over	147.7	21.61	over
	CD Submodel 3	102.84	14.67	41.8	5.36	over	163.9	23.98	over
	CD Submodel 4	88.56	12.70	28.6	3.67	over	148.5	21.73	over
	CD Submodel 5	110.74	15.77	48.5	6.23	over	173.0	25.31	over
	CD Submodel 6	100.14	14.31	38.0	4.88	over	162.3	23.74	over
BSB Submodels	BSB Submodel 7	99.39	14.20	38.5	4.97	over	160.3	23.45	over
	BSB Submodel 8	84.66	12.16	24.9	3.20	over	144.4	21.13	over
	BSB Submodel 9	97.98	14.00	37.0	4.75	over	158.9	23.25	over
	BSB Submodel 10	83.21	11.96	23.5	3.01	over	142.9	20.91	over
	BSB Submodel 11	85.97	12.34	26.7	3.42	over	145.3	21.25	over
	BSB Submodel 12a	104.77	14.94	43.2	5.55	over	166.3	24.33	over
	BSB Submodel 12b	101.10	14.43	40.4	5.19	over	161.8	23.67	over
Benchmark Models	CD Original Main Model	86.74	12.34	39.5	5.07	over	134.0	19.60	over
	BSB Original Main Model	74.82	10.70	27.6	3.55	over	122.0	17.85	over
	10-Year Average Index	108.90	15.38	61.2	7.85	over	156.7	22.92	over
	30-Year Average Index	97.05	13.76	49.3	6.33	over	144.8	21.19	over
	50-Year Average Index	137.92	19.37	90.2	11.58	over	185.7	27.16	over
	Market Model	10.75	1.41	18.0	2.31	over	3.5	0.51	under

Table D.2: Mean Absolute Errors and Mean Absolute Percentage Errors for HDD February contracts.

HDD Monthly Contracts		HDDMar11-12 - H4H							
		MAE	MAPE	AE 11	APE 11	Under/Overforecast	AE 12	APE 12	Under/Overforecast
CD Submodels	CD Submodel 1	133.94	28.52	43.1	6.02	under	224.8	51.02	over
	CD Submodel 2	132.98	27.65	58.1	8.12	under	207.9	47.19	over
	CD Submodel 3	134.02	28.51	43.8	6.11	under	224.3	50.92	over
	CD Submodel 4	133.07	27.65	58.5	8.17	under	207.6	47.14	over
	CD Submodel 5	137.81	31.17	2.6	0.36	under	273.0	61.99	over
	CD Submodel 6	135.47	30.61	3.3	0.46	under	267.7	60.77	over
BSB Submodels	BSB Submodel 7	133.93	28.22	49.9	6.98	under	217.9	49.47	over
	BSB Submodel 8	132.94	27.34	65.1	9.10	under	200.8	45.58	over
	BSB Submodel 9	134.01	28.24	50.0	6.98	under	218.0	49.49	over
	BSB Submodel 10	132.83	27.31	65.2	9.10	under	200.5	45.52	over
	BSB Submodel 11	132.50	29.09	22.6	3.16	under	242.4	55.02	over
	BSB Submodel 12a	134.57	29.73	18.8	2.63	under	250.3	56.83	over
	BSB Submodel 12b	133.73	29.39	22.1	3.08	under	245.4	55.71	over
Benchmark Models	CD Original Main Model	137.62	29.22	46.4	6.48	under	228.9	51.95	over
	BSB Original Main Model	137.62	30.05	27.2	3.80	under	248.0	56.30	over
	10-Year Average Index	137.75	30.10	26.8	3.74	under	248.7	56.46	over
	30-Year Average Index	137.75	30.45	18.7	2.62	under	256.8	58.29	over
	50-Year Average Index	137.75	31.19	1.9	0.26	under	273.7	62.12	over
	Market Model	131.75	27.99	44.0	6.15	under	219.5	49.83	over

Table D.3: Mean Absolute Errors and Mean Absolute Percentage Errors for HDD March contracts.

HDD Monthly Contracts		HDDApr11-12 - H4J							
		MAE	MAPE	AE 11	APE 11	Under/Overforecast	AE 12	APE 12	Under/Overforecast
CD Submodels	CD Submodel 1	25.83	4.49	12.7	3.55	under	38.9	5.44	over
	CD Submodel 2	24.95	5.37	27.1	7.55	under	22.8	3.19	over
	CD Submodel 3	25.89	4.53	13.1	3.66	under	38.6	5.40	over
	CD Submodel 4	25.03	5.38	27.0	7.54	under	23.0	3.21	over
	CD Submodel 5	53.96	9.46	27.6	7.70	over	80.3	11.22	over
	CD Submodel 6	59.50	10.61	33.0	9.20	over	86.0	12.01	over
BSB Submodels	BSB Submodel 7	25.82	4.94	19.2	5.35	under	32.4	4.53	over
	BSB Submodel 8	24.93	5.82	33.5	9.35	under	16.3	2.28	over
	BSB Submodel 9	25.91	4.83	17.4	4.84	under	34.5	4.81	over
	BSB Submodel 10	25.03	5.69	31.5	8.79	under	18.5	2.59	over
	BSB Submodel 11	27.44	4.09	3.7	1.02	over	51.2	7.15	over
	BSB Submodel 12a	34.62	5.43	8.6	2.39	over	60.7	8.47	over
	BSB Submodel 12b	30.69	4.66	5.4	1.52	over	56.0	7.81	over
Benchmark Models	CD Original Main Model	29.58	5.26	16.2	4.51	under	43.0	6.01	over
	BSB Original Main Model	29.60	4.37	3.4	0.94	under	55.8	7.80	over
	10-Year Average Index	30.25	5.01	11.3	3.15	under	49.2	6.87	over
	30-Year Average Index	40.30	6.33	10.1	2.80	over	70.6	9.85	over
	50-Year Average Index	61.51	10.77	31.3	8.72	over	91.8	12.82	over
	Market Model	26.25	5.09	20.5	5.72	under	32.0	4.47	over

Table D4: Mean Absolute Errors and Mean Absolute Percentage Errors for HDD April contracts.

HDD Seasonal Contract		HDDNov11-Mar12 - H4XH		
		AE	APE	Under/Overforecast
CD Submodels	CD Submodel 1	692.2	22.79	over
	CD Submodel 2	611.1	20.12	over
	CD Submodel 3	696.4	22.93	over
	CD Submodel 4	616.3	20.29	over
	CD Submodel 5	761.3	25.06	over
	CD Submodel 6	752.6	24.78	over
BSB Submodels	BSB Submodel 7	677.9	22.32	over
	BSB Submodel 8	595.3	19.60	over
	BSB Submodel 9	675.4	22.24	over
	BSB Submodel 10	592.5	19.51	over
	BSB Submodel 11	628.6	20.70	over
	BSB Submodel 12a	694.8	22.87	over
	BSB Submodel 12b	672.1	22.13	over
Benchmark Models	CD Original Main Model	674.1	22.19	over
	BSB Original Main Model	667.6	21.98	over
	10-Year Average Index	715.8	23.56	over
	30-Year Average Index	784.4	25.82	over
	50-Year Average Index	919.1	30.26	over
	Market Model	353.5	11.64	over

Table D5: Absolute Errors and Absolute Percentage Errors for HDD seasonal contract.

CDD Monthly Contracts		CDDApr11-12 - K4I							
		MAE	MAPE	AE 11	APE 11	Under/Overforecast	AE 12	APE 12	Under/Overforecast
CD Submodels	CD Submodel 1	8.71	178.59	1.3	267.84	over	16.1	89.34	under
	CD Submodel 2	8.66	222.09	1.8	357.95	over	15.5	86.23	under
	CD Submodel 3	8.67	306.68	2.7	531.77	over	14.7	81.59	under
	CD Submodel 4	8.61	368.95	3.3	660.62	over	13.9	77.29	under
	CD Submodel 5	8.75	135.25	0.9	178.25	over	16.6	92.26	under
	CD Submodel 6	8.74	208.27	1.6	328.51	over	15.8	88.03	under
BSB Submodels	BSB Submodel 7	8.70	212.55	1.7	337.82	over	15.7	87.28	under
	BSB Submodel 8	8.64	263.30	2.2	442.90	over	15.1	83.70	under
	BSB Submodel 9	8.67	344.92	3.1	610.50	over	14.3	79.34	under
	BSB Submodel 10	8.59	413.92	3.8	753.27	over	13.4	74.57	under
	BSB Submodel 11	8.65	179.51	1.4	270.38	over	16.0	88.64	under
	BSB Submodel 12a	8.69	325.76	2.9	570.79	over	14.5	80.73	under
	BSB Submodel 12b	8.65	338.53	3.0	597.52	over	14.3	79.54	under
Benchmark Models	CD Original Main Model	8.75	187.57	1.4	285.87	over	16.1	89.28	under
	BSB Original Main Model	8.80	194.82	1.5	300.20	over	16.1	89.43	under
	10-Year Average Index	8.75	1404.86	14.0	2790.00	over	3.6	19.72	under
	30-Year Average Index	8.75	750.23	7.2	1443.33	over	10.3	57.13	under
	50-Year Average Index	8.75	662.08	6.3	1262.00	over	11.2	62.17	under
	Market Model	8.75	1263.89	12.5	2500.00	over	5.0	27.78	under

Table D6: Mean Absolute Errors and Mean Absolute Percentage Errors for CDD April contracts.

CDD Monthly Contracts		CDDMay11-12 - K4K							
		MAE	MAPE	AE 11	APE 11	Under/Overforecast	AE 12	APE 12	Under/Overforecast
CD Submodels	CD Submodel 1	27.62	31.37	15.6	22.30	under	39.6	40.44	under
	CD Submodel 2	20.20	22.41	8.8	12.62	under	31.6	32.21	under
	CD Submodel 3	19.57	21.52	7.6	10.87	under	31.5	32.17	under
	CD Submodel 4	12.13	12.55	0.8	1.16	under	23.4	23.93	under
	CD Submodel 5	27.11	30.68	14.8	21.13	under	39.4	40.23	under
	CD Submodel 6	25.70	28.94	13.3	19.01	under	38.1	38.88	under
BSB Submodels	BSB Submodel 7	27.20	30.87	15.3	21.80	under	39.1	39.94	under
	BSB Submodel 8	19.51	21.60	8.3	11.79	under	30.8	31.41	under
	BSB Submodel 9	17.95	19.55	6.1	8.65	under	29.8	30.44	under
	BSB Submodel 10	11.22	11.64	0.9	1.33	over	21.5	21.95	under
	BSB Submodel 11	16.39	17.89	5.7	8.13	under	27.1	27.64	under
	BSB Submodel 12a	20.82	23.01	8.7	12.38	under	33.0	33.64	under
Benchmark Models	BSB Submodel 12b	18.88	20.72	7.2	10.23	under	30.6	31.21	under
	CD Original Main Model	28.17	31.73	14.6	20.88	under	41.7	42.58	under
	BSB Original Main Model	17.06	18.14	3.6	5.11	under	30.5	31.17	under
	10-Year Average Index	21.20	23.10	7.2	10.29	under	35.2	35.92	under
	30-Year Average Index	22.55	24.76	8.6	12.21	under	36.6	37.30	under
	50-Year Average Index	28.67	32.25	14.7	20.96	under	42.7	43.54	under
Market Model	26.00	28.98	12.0	17.14	under	40.0	40.82	under	

Table D7: Mean Absolute Errors and Mean Absolute Percentage Errors for CDD May contracts.

CDD Monthly Contracts		CDDJun11-12 - K4M							
		MAE	MAPE	AE 11	APE 11	Under/Overforecast	AE 12	APE 12	Under/Overforecast
CD Submodels	CD Submodel 1	6.11	2.57	9.0	3.82	over	3.3	1.32	over
	CD Submodel 2	21.34	8.88	23.3	9.92	over	19.4	7.83	over
	CD Submodel 3	10.31	4.31	13.2	5.63	over	7.4	2.99	over
	CD Submodel 4	25.05	10.41	27.0	11.52	over	23.1	9.31	over
	CD Submodel 5	11.39	4.77	15.3	6.51	over	7.5	3.03	over
	CD Submodel 6	9.14	3.84	12.9	5.52	over	5.3	2.15	over
BSB Submodels	BSB Submodel 7	11.40	4.76	14.2	6.04	over	8.6	3.48	over
	BSB Submodel 8	26.88	11.17	28.7	12.23	over	25.1	10.11	over
	BSB Submodel 9	16.93	7.05	19.7	8.42	over	14.1	5.69	over
	BSB Submodel 10	32.06	13.32	33.9	14.47	over	30.2	12.18	over
	BSB Submodel 11	34.52	14.33	35.7	15.24	over	33.3	13.43	over
	BSB Submodel 12a	9.44	3.95	12.6	5.39	over	6.2	2.51	over
Benchmark Models	BSB Submodel 12b	13.52	5.64	15.9	6.79	over	11.1	4.49	over
	CD Original Main Model	5.66	2.40	10.5	4.49	over	0.8	0.32	under
	BSB Original Main Model	30.80	12.84	36.4	15.53	over	25.2	10.15	over
	10-Year Average Index	12.95	5.45	19.7	8.40	over	6.2	2.50	over
	30-Year Average Index	6.75	2.75	2.6	1.10	over	10.9	4.40	under
	50-Year Average Index	22.88	9.41	16.1	6.88	under	29.6	11.95	under
Market Model	17.75	7.44	24.5	10.45	over	11.0	4.44	over	

Table D8: Mean Absolute Errors and Mean Absolute Percentage Errors for CDD June contracts.

CDD Monthly Contracts		CDDJul11-12 - K4N							
		MAE	MAPE	AE 11	APE 11	Under/Overforecast	AE 12	APE 12	Under/Overforecast
CD Submodels	CD Submodel 1	53.33	11.15	55.5	11.60	under	51.2	10.69	under
	CD Submodel 2	36.42	7.61	39.4	8.23	under	33.5	7.00	under
	CD Submodel 3	51.41	10.74	53.4	11.16	under	49.4	10.33	under
	CD Submodel 4	34.98	7.31	37.9	7.92	under	32.0	6.70	under
	CD Submodel 5	68.42	14.30	69.2	14.46	under	67.6	14.13	under
	CD Submodel 6	62.79	13.12	63.7	13.31	under	61.9	12.94	under
BSB Submodels	BSB Submodel 7	46.68	9.76	48.7	10.18	under	44.7	9.34	under
	BSB Submodel 8	29.83	6.23	32.8	6.86	under	26.8	5.61	under
	BSB Submodel 9	49.60	10.37	51.5	10.77	under	47.7	9.96	under
	BSB Submodel 10	32.75	6.84	35.7	7.46	under	29.8	6.23	under
	BSB Submodel 11	44.79	9.36	48.4	10.12	under	41.2	8.60	under
	BSB Submodel 12a	50.72	10.60	52.4	10.95	under	49.0	10.25	under
Benchmark Models	BSB Submodel 12b	46.07	9.63	48.6	10.16	under	43.5	9.09	under
	CD Original Main Model	54.00	11.29	54.9	11.48	under	53.1	11.09	under
	BSB Original Main Model	54.40	11.37	55.4	11.58	under	53.4	11.16	under
	10-Year Average Index	69.12	14.45	69.1	14.45	under	69.1	14.45	under
	30-Year Average Index	85.76	17.92	85.8	17.92	under	85.8	17.92	under
	50-Year Average Index	103.41	21.61	103.4	21.61	under	103.4	21.61	under
Market Model	147.00	30.72	147.5	30.72	under	147.5	30.72	under	

Table D9: Mean Absolute Errors and Mean Absolute Percentage Errors for CDD July contracts.

CDD Monthly Contracts		CDDAug11-12 - K4Q								
		MAE	MAPE	AE 11	APE 11	Under/Overforecast	AE 12	APE 12	Under/Overforecast	
CD Submodels	CD Submodel 1	43.18	11.66	52.0	15.24	over	34.4	8.08	under	
	CD Submodel 2	42.21	11.90	67.9	19.90	over	16.6	3.89	under	
	CD Submodel 3	43.19	11.71	53.4	15.67	over	32.9	7.74	under	
	CD Submodel 4	42.22	11.93	69.0	20.25	over	15.4	3.62	under	
	CD Submodel 5	43.90	11.46	39.1	11.48	over	48.6	11.43	under	
	CD Submodel 6	43.93	11.74	48.8	14.30	over	39.1	9.18	under	
BSB Submodels	BSB Submodel 7	43.15	11.78	56.2	16.49	over	30.1	7.07	under	
	BSB Submodel 8	42.15	12.01	72.2	21.18	over	12.1	2.84	under	
	BSB Submodel 9	43.24	11.82	57.0	16.72	over	29.5	6.93	under	
	BSB Submodel 10	42.03	11.99	72.6	21.29	over	11.5	2.70	under	
	BSB Submodel 11	41.03	11.35	58.8	17.23	over	23.3	5.48	under	
	BSB Submodel 12a	43.43	12.03	62.6	18.36	over	24.3	5.70	under	
	BSB Submodel 12b	42.53	11.93	66.5	19.50	over	18.6	4.36	under	
Benchmark Models	CD Original Main Model	41.40	11.18	49.9	14.64	over	32.9	7.73	under	
	BSB Original Main Model	41.34	10.97	43.1	12.63	over	39.6	9.31	under	
	10-Year Average Index	42.25	11.70	60.8	17.84	over	23.7	5.56	under	
	30-Year Average Index	42.25	10.48	18.8	5.51	over	65.7	15.44	under	
	50-Year Average Index	42.25	10.01	2.8	0.83	over	81.7	19.19	under	
	Market Model	105.25	26.02	44.0	12.90	over	166.5	39.13	under	

Table D10: Mean Absolute Errors and Mean Absolute Percentage Errors for CDD August contracts.

CDD Monthly Contracts		CDDSep11-12 - K4U								
		MAE	MAPE	AE 11	APE 11	Under/Overforecast	AE 12	APE 12	Under/Overforecast	
CD Submodels	CD Submodel 1	14.76	7.93	17.2	9.06	under	12.3	6.80	under	
	CD Submodel 2	3.23	1.73	4.0	2.09	under	2.5	1.37	over	
	CD Submodel 3	10.28	5.51	12.7	6.72	under	7.8	4.31	under	
	CD Submodel 4	3.26	1.80	0.0	0.01	-	6.5	3.59	over	
	CD Submodel 5	8.76	4.70	10.5	5.54	under	7.0	3.86	under	
	CD Submodel 6	2.89	1.54	4.6	2.42	under	1.2	0.65	under	
BSB Submodels	BSB Submodel 7	13.65	7.33	16.1	8.49	under	11.2	6.17	under	
	BSB Submodel 8	3.29	1.79	2.5	1.32	under	4.1	2.25	over	
	BSB Submodel 9	6.74	3.60	9.2	4.83	under	4.3	2.38	under	
	BSB Submodel 10	7.32	3.99	4.1	2.15	over	10.5	5.83	over	
	BSB Submodel 11	9.60	5.24	5.4	2.84	over	13.8	7.63	over	
	BSB Submodel 12a	5.10	2.73	7.2	3.78	under	3.0	1.68	under	
	BSB Submodel 12b	2.82	1.51	3.8	2.00	under	1.8	1.02	over	
Benchmark Models	CD Original Main Model	14.96	8.00	20.4	10.72	under	9.6	5.28	under	
	BSB Original Main Model	7.35	3.89	12.9	6.78	under	1.8	1.01	under	
	10-Year Average Index	4.50	2.47	1.5	0.79	under	7.5	4.14	over	
	30-Year Average Index	23.36	12.54	27.9	14.66	under	18.9	10.42	under	
	50-Year Average Index	32.79	17.63	37.3	19.63	under	28.3	15.63	under	
	Market Model	40.50	22.34	3.0	1.58	under	78.0	43.09	over	

Table D11: Mean Absolute Errors and Mean Absolute Percentage Errors for CDD August contracts.

CDD Seasonal Contract		CDDMay11-Sep11- K4KU		
		AE	APE	Under/Overforecast
CD Submodels	CD Submodel 1	27.4	2.08	under
	CD Submodel 2	39.0	2.96	over
	CD Submodel 3	7.1	0.54	under
	CD Submodel 4	57.4	4.37	over
	CD Submodel 5	40.10	3.05	under
	CD Submodel 6	19.9	1.51	under
BSB Submodels	BSB Submodel 7	9.7	0.74	under
	BSB Submodel 8	57.3	4.36	over
	BSB Submodel 9	10.0	0.76	over
	BSB Submodel 10	75.9	5.77	over
	BSB Submodel 11	45.8	3.48	over
	BSB Submodel 12a	7.0	0.53	over
	BSB Submodel 12b	22.8	1.73	over
Benchmark Models	CD Original Main Model	29.5	2.24	under
	BSB Original Main Model	7.6	0.58	over
	10-Year Average Index	2.7	0.21	over
	30-Year Average Index	100.8	7.67	under
	50-Year Average Index	168.7	12.84	under
	Market Model	21.0	1.60	under

Table D11: Absolute Errors and Absolute Percentage Errors for CDD seasonal contract.