CME Group

A CME/Chicago Board of Trade/NYMEX Company

WEATHER PRODUCTS

Dog Days and Degree Days

By J. Scott Mathews

PRESIDENT, WEATHEREX LLC

Many residents in the Northeast and Midwest are wondering if the cool summer was a late spring or an early autumn. If you scanned the midsummer news headlines, one theme in July kept "bustin' out all over" (see Figure 1).

WHEN WEATHER IS COOL NEWS

The New York Times, July 31, 2009
In New York, It's the Summer That Isn't
by Sam Roberts

Minneapolis Star Tribune, July 31, 2009
July in Minnesota: The Big Chill
by Tim Harlow

The Detriot News, August 1, 2009
The Summer That Hot Forgot
by Steve Pardo

The Boston Globe, August 1, 2009
You Call This Summer?
by Globe Staff

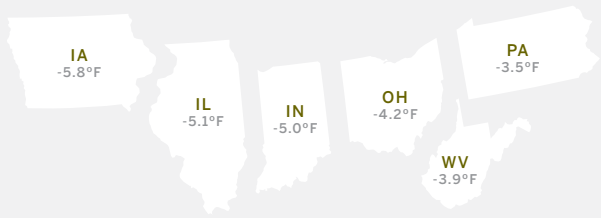
Indiana's New Center, August 1, 2009
Coolest July Ever
by Mason Meyers

L.A. Now, August 4, 2009
Where's the Heat?
from the staff of the Los Angeles Times

FIGURE 1

It isn't just that July was a bit on the cool side: records were broken (see Figure 2).

JULY 2009 WAS EXTRAORDINARILY COOL IN SIX STATES FORMING A BAND FROM IOWA TO PENNSYLVANIA.



These states experienced the coldest July in over 100 years of keeping temperature records.

FIGURE 2

Residents in the Southwest and Northwest, experienced a different problem as they've been battling hotter than normal temperatures. Even though heat is what summer is supposed to be about, the news industry doesn't seem to cover this storyline as dramatically (see Figure 3).

WHEN WEATHER IS HOT NEWS

The Associated Press, July 28, 2009
Pacific Northwest Sweats as Heat Wave Continues
by Ryan Kost

USA Today, July 29, 2009
It's Too Darn Hot... In the Northwest
by Megan H. Chan

Wine Press Northwest, July 31, 2009
How Hot Is It? Too Hot for Grapevines
by Andy Perdue

Grand Junction (CO) DailySentinel, August 3, 2009
Trees Offer Leafy Relief from Searing Summer Sun
by Melina Mawdsley

Yakima (WA) Herald-Republic, August 3, 2009
Surprise! July Was Hotter Than Usual
by Darcy Wytko

abc15.com (AZ), August 5, 2009
July of 2009 Was the Hottest on Record!
by Bill Bellis

FIGURE 3

The repercussions of Mother Nature have affected an already stressed economy. Many farmers in the Midwest and Northeast fear a systemic breakdown in the growing process. Some crops did not get the heat they needed in order to mature. Corn pollination was delayed, thereby suppressing kernel development and reducing yield. Illinois farmers were concerned about corn root depth and worried that harvest time could be as late as November.

On the other hand, a few farmers are projecting a windfall, as some agricultural products seem to enjoy the anomalous season; the Michigan Cherry Committee, for one, looks forward to a 300 million pound crop, a 50 percent increase over their 2008 yield. Apparently, the slower pace of ripening has also improved the quality of the cherries.

In the cooler regions, producers and consumers of electric power noticed the financial impact of the "severely mild" temperatures. Consumers saved money due to lower demand for electricity at the expense of suppliers working "north of the meter" who saw lower revenue flows. Bad weather can be a blessing for some, and a curse for others (see Figure 4).

WEATHER NEWS: THE GOOD, THE BAD AND THE UGLY

The Windsor Star (ON), July 23, 2009
Benefits of cool July: Cleaner air, better wine, garbage with less stink
by Gary Rennie

Reuters, August 3, 2009
Temperature Wars: The Struggle Between Energy Savings and Employee Comfort
by GreenBiz.com

Pioneer Press (MN), August 3, 2009
Impact of cool weather is double-edged sword for slow-growing soybean crop: farmers say it's helped, while traders think yields will be cut
by Tom Webb

The Mountain Press (TN), August 3, 2009
Let it rain: Power of a shower is good for some, but bad for others
by Derek Hodges

FIGURE 4

Industries like energy, transportation, travel, entertainment, recreation, insurance, as well as institutions and municipalities that depend on certain weather conditions can diminish the uncertainty of temperature, rainfall, snowfall, windiness, sunshine or humidity and hurricanes by entering into weather derivative agreements. Revenues and expenses can ebb and flow from changing weather, and these dollars can be protected, to an extent, with contracts that span the spectrum from insurance and reinsurance, to futures, options and over-the-counter transactions.

The most prominent weather derivatives are heating degree day (HDD) and cooling degree day (CDD) products that are traded at CME Group (NYSE: CME). HDD are designed for winter and CDD for summer (see Figure 5).

HOW ARE CME GROUP WEATHER FUTURES PRICED?

Each contract is referenced to one of 24 U.S. cities.
One HDD or CDD is worth $20.
An HDD is 65°F minus a given day's TAVG.
A CDD is the day's TAVG minus 65°F.
Note: TAVG = { TMIN + TMAX } ÷ 2

Daily Examples:

1) A day in Kansas City having 14 HDDs is "$100 colder" (per contract) than a day with 9 HDDs.

2) If a day in Tucson averages 90°F then there were 25 CDDs recorded. That day would be "$400 hotter" than a 70°F day with only 5 CDDs.

Monthly Examples:
(Each CME degree day futures contract is based on a specific calendar month, or series of months, and is financially settled according to the cumulative tally of the daily HDDs, or CDDs, counted during the course of that period.)

3) If the December Philadelphia contract trades on Dec. 1st at 1025 HDDs, then settles on Dec. 31st at 1080, then the buyer receives $1,100 per contract from the 55 HDD colder outcome.

4) A short seller of May Dallas futures whose entry level is 385 CDDs would make $600 per contract if the end of month total was only 355 CDDs.

Source: firstenercastfinancial.com

FIGURE 5

Felix Carabello, CME Group's director of alternative investment products, says weather derivatives appeal to customers representing a broad array of sectors.

"These products are engineered for any industry that faces business uncertainty as a result of extreme weather," says Carabello. "CME Group facilitates the transfer of their financial risk exposure to the capital markets."

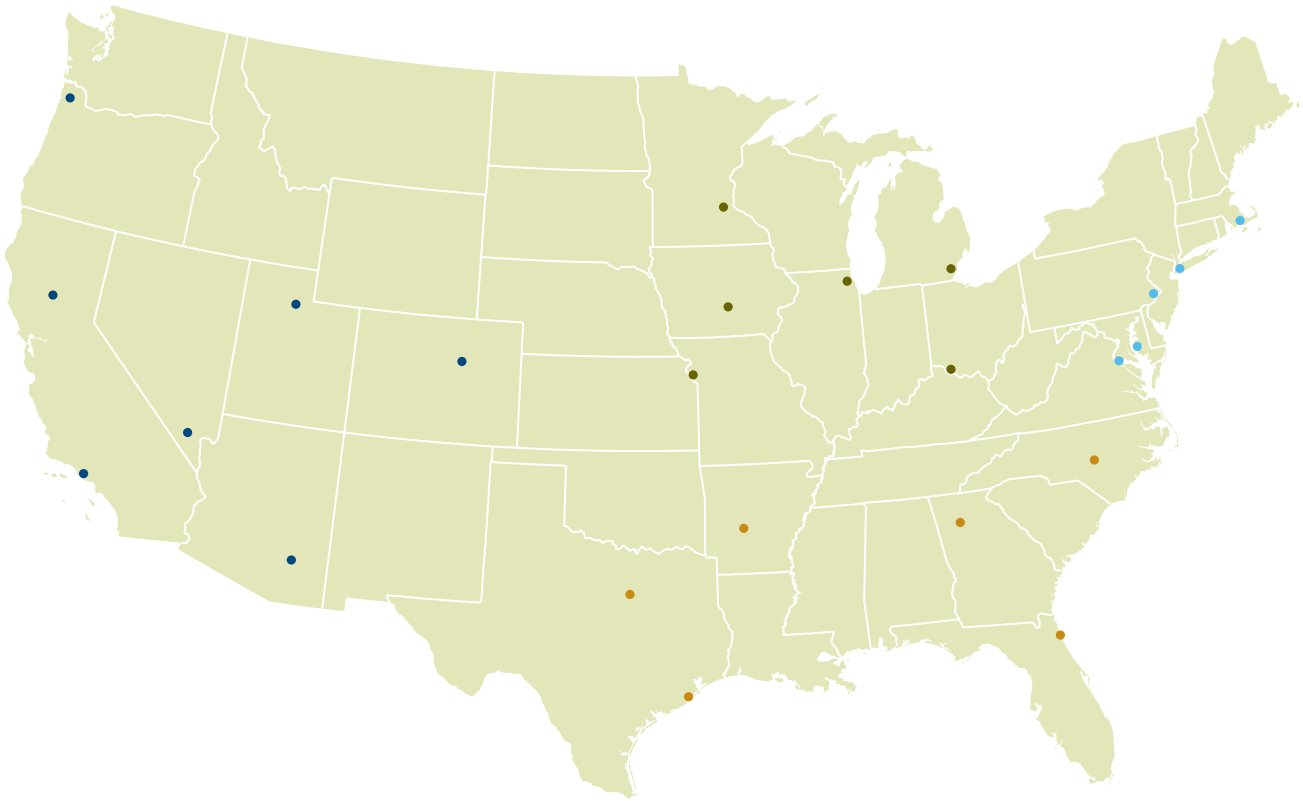
Degree day contracts enable risk avoiders and risk takers to exchange their temperature exposure through the secure financial mechanism of CME Clearing. For example, an energy supplier that loses money in a cool summer can swap that risk with a company that consumes more electric power for cooling buildings when the weather is hot.

By using CME Group's contracts traded with a futures commission merchant (a clearing brokerage firm), the two parties in this example don't have the added exposure to one another's credit worthiness. Each one is solely contracting with CME Group. Other participants in the weather futures market are investors or speculators who may be hedge funds, proprietary trading companies, institutional commodity desks, and insurance/reinsurance companies, among others.

Each futures contract at CME Group is pegged to a specific city. For temperature index transactions, there are 24 cities in the United States (see Figure 6), ten in Europe, six in Canada, three in Australia and three in Japan.

CME GROUP WEATHER DERIVATIVES

Futures customers can trade contracts based on the temperature index in any of 24 U.S. cities.



WEST

Colorado Springs
Las Vegas
Los Angeles
Portland
Sacramento
Salt Lake City
Tucson

SOUTH

Atlanta
Dallas
Houston
Jacksonville
Little Rock
Raleigh

MIDWEST

Chicago
Cincinnati
Des Moines
Detroit
Kansas City
Minneapolis

NORTHEAST

Baltimore
Boston
New York
Philadelphia
Washington D.C.

FIGURE 6

Each degree day is valued at $20 per contract. If an energy company had placed a short position (sold) of 1000 contracts of July Cincinnati futures at 324 CDD (the 10 year average), this seller was probably hedging itself against a cooler than average month. Because the weather *did* turn out to be cool, and the final settlement price was 164.5 accumulated CDD, then the company would have earned $3.19 million on its hedge:

(324 CDD – 164.5 CDD) X 1000 contracts X $20 = $3,190,000

Of course, in the event of a hotter than average July in Cincinnati, the outcome would have been a loss on the hedge. Because the purpose of hedging is to limit downside risk, a hot July would render the short hedge a financial loss; but an acceptable loss since a hot period will greatly increase the volume of energy sold. This fact underscores the basic premise of degree day hedging: it is not *price* uncertainty that is managed, but *volumetric* uncertainty. Weather traders and hedgers look at historical averages (see Figure 7) to determine the probability of various scenarios in the future. In the weather market, the participants value their analysis from the temperature measurements taken at specific airport weather stations that are nearest to the location of the risk. For example, Cincinnati's data is collected at the airport across the state line in Covington, Kentucky. The airport code for Covington is "CVG".

City	Airport Code	July 2009 Actual Temp	10 year Avg Temp 1999-2008	July 2009 Temp Avg vs. '09	July 2009 Actual CDD	10 year Avg CDD 1999-2008	July 2009 CDD Avg vs '09	July 2009 $ per Contract vs Avg	July 2009 Percent vs Avg
Atlanta	(ATL)	78.1	79.6	-1.5	406.5	451	-44.5	($890)	-9.9%
Baltimore	(BWI)	74.6	76.8	-2.2	299	366	-67	($1,340)	-18.3%
Boston	(BOS)	70.5	73.3	-2.8	187	261	-74	($1,480)	-28.4%
Chicago	(ORD)	69.4	74.4	-5.0	146	295	-149	($2,980)	-50.5%
Cincinnati	(CVG)	70.1	75.4	-5.3	164.5	324	-159.5	($3,190)	-49.2%
Colorado Springs	(COS)	68.6	72.5	-3.9	136	237	-101	($2,020)	-42.6%
Dallas	(DFW)	86.5	85.9	0.6	668	647	21	$420	3.2%
Des Moines	(DSM)	72	76.7	-4.7	220.5	364	-143.5	($2,870)	-39.4%
Detroit	(DTW)	68.9	73.8	-4.9	126.5	275	-148.5	($2,970)	-54.0%
Houston	(IAH)	87.4	83.9	3.5	693	586	107	$2,140	18.3%
Jacksonville	(JAX)	81.2	81.6	-0.4	503	513	-10	($200)	-1.9%
Kansas City	(MCI)	73.5	79.1	-5.6	264	437	-173	($3,460)	-39.6%
Las Vegas	(LAS)	94.7	93.2	1.5	919.5	874	45.5	$910	5.2%
Little Rock	(LIT)	79	82.2	-3.2	433	534	-101	($2,020)	-18.9%
Los Angeles	(CQT)	74	73.6	0.4	280	267	13	$260	4.9%
Minneapolis	(MSP)	70	75.5	-5.5	164.5	329	-164.5	($3,290)	-50.0%
New York	(LGA)	74.5	78.0	-3.5	293.5	404	-110.5	($2,210)	-27.4%
Philadelphia	(PHL)	75.9	78.0	-2.1	338.5	403	-64.5	($1,290)	-16.0%
Portland (OR)	(PDX)	73.6	69.5	4.1	273.5	152	121.5	$2,430	79.9%
Raleigh	(RDU)	79.5	79.2	0.3	451	440	11	$220	2.5%
Sacramento	(SAC)	75.4	75.6	-0.2	321	328	-7	($140)	-2.1%
Salt Lake City	(SLC)	79.1	81.2	-2.1	436	502	-66	($1,320)	-13.1%
Tucson	(TUS)	90.1	87.4	2.7	777	694	83	$1,660	12.0%
Washington D.C.	(DCA)	76.9	79.1	-2.2	368	437	-69	($1,380)	-15.8%

FIGURE 7

SOURCE: MSI GUARANTEEWEATHER TRADING LTD.
TEMPERATURES IN DEGREES FAHRENHEIT

Energy businesses are active in hedging their degree day exposures in the weather risk market because demand is closely tied to temperature. Transactions can be structured as insurance coverage, over-the-counter instruments, or CME Group products (futures or options on futures). "To get an idea of weather's impact on energy demand I like to look at population weighted cooling demand figures for the major cities across the nation," said Ben Smith, president of First Enercast Financial, a publisher of daily energy and weather market information (see Figure 8).

COOLING DEGREE DAY DATA WEEKLY SUMMARY
POPULATION-WEIGHTED STATE, REGIONAL AND NATIONAL AVERAGES

Climate Prediction Center-NCEP-NWS-NOAA

State	Week Total	Week Dev. From Norm.	Week Dev. From Last Year	Cum. Total	Cum. Dev. From Norm.	Cum. Dev. From Last Year	Cum. Dev. From Norm. PCT(%)	Cum. Dev. From Last Year PCT (%)
ALABAMA	110	9	32	1358	71	-5	6	0
ALASKA	0	0	0	17	4	11	-999*	-999*
ARIZONA	130	-12	-13	1947	29	157	2	9
ARKANSAS	96	-9	26	1227	-25	-57	-2	-4
CALIFORNIA	57	3	-7	599	30	-74	5	-11
COLORADO	28	7	-3	253	30	-107	13	-30
CONNECTICUT	53	6	27	308	-139	-209	-31	-40
DELAWARE	91	18	47	794	15	-80	2	-9
D.C.	123	26	47	1005	-98	-167	-9	-14
FLORIDA	127	9	11	2179	66	-25	3	-1
GEORGIA	106	13	27	1248	59	22	5	2
HAWAII	112	1	1	2556	69	-218	3	-8
IDAHO	24	-15	-17	369	21	-23	6	-6
ILLINOIS	70	11	48	493	-183	-95	-27	-16
INDIANA	69	12	55	563	-121	-39	-18	-6
IOWA	62	6	27	487	-176	-56	-27	-10
KANSAS	92	-3	36	895	-159	-51	-15	-5
KENTUCKY	82	8	44	802	-56	-43	-7	-5
LOUISIANA	123	4	16	1856	129	85	7	5
MAINE	23	1	23	128	-61	-56	-32	-30
MARYLAND	99	29	58	769	8	-56	1	-7
MASSACHUSETTS	42	3	32	231	-130	-182	-36	-44
MICHIGAN	56	15	51	223	-230	-121	-51	-35
MINNESOTA	50	16	24	274	-131	-45	-32	-14
MISSISSIPPI	114	6	33	1508	73	45	5	3
MISSOURI	82	0	38	765	-164	-43	-18	-5
MONTANA	18	-5	-13	202	9	-42	5	-17
NEBRASKA	67	-1	20	591	-189	-81	-24	-12

FIGURE 8

State	Week Total	Week Dev. From Norm.	Week Dev. From Last Year	Cum. Total	Cum. Dev. From Norm.	Cum. Dev. From Last Year	Cum. Dev. From Norm. PCT(%)	Cum. Dev. From Last Year PCT (%)
NEVADA	97	-15	-22	1273	-76	-13	-6	-1
NEW HAMPSHIRE	35	8	34	145	-110	-108	-43	-43
NEW JERSEY	73	15	46	500	-87	-179	-15	-26
NEW MEXICO	54	-4	-4	688	5	61	1	10
NEW YORK	63	14	38	368	-108	-179	-23	-33
NORTH CAROLINA	98	15	35	1098	106	-21	11	-2
NORTH DAKOTA	49	13	17	239	-131	-44	-35	-16
OHIO	72	22	61	473	-93	-67	-16	-12
OKLAHOMA	109	-7	20	1312	-11	-19	-1	-1
OREGON	16	-6	-18	294	129	54	78	23
PENNSYLVANIA	73	24	60	439	-72	-108	-14	-20
RHODE ISLAND	46	3	26	267	-99	-230	-27	-46
SOUTH CAROLINA	105	7	17	1309	46	-26	4	-2
SOUTH DAKOTA	52	-1	6	380	-199	-88	-34	-19
TENNESSEE	86	4	40	949	-22	-34	-2	-3
TEXAS	141	13	8	2046	257	116	14	6
UTAH	43	-10	-15	527	13	-106	3	-17
VERMONT	36	13	36	131	-100	-50	-43	-28
VIRGINIA	90	21	48	795	27	-47	4	-6
WASHINGTON	12	-7	-10	256	112	86	78	51
WEST VIRGINIA	67	14	42	533	-44	-14	-8	-3
WISCONSIN	54	16	47	228	-178	-59	-44	-21
WYOMING	19	-5	-9	191	-48	-96	-20	-33
REGION								
NEW ENGLAND	42	4	30	231	-106	-168	-31	-42
MIDDLE ATLANTIC	68	16	47	418	-87	-157	-17	-27
E N CENTRAL	65	16	53	406	-149	-82	-27	-17
W N CENTRAL	69	6	29	567	-147	-52	-21	-8
SOUTH ATLANTIC	107	15	30	1369	64	-24	5	-2
E S CENTRAL	96	7	38	1114	18	-15	2	-1
W S CENTRAL	131	8	12	1869	201	82	12	5
MOUNTAIN	68	-3	-11	925	55	4	6	1
PACIFIC	48	3	-8	528	85	-42	19	-7
UNITED STATES	**79**	**10**	**26**	**849**	**0**	**-50**	**0**	**-5**

(2000 CDD normals implemented 1/1/2003)

*Last date of data collection period is August 15, 2009 accumulations are from January 1, 2009 to August 15, 2009 -999 = normal less than 100 or ratio incalculable

FIGURE 8 CONT'D

"This summer was a very even split, where the eastern half of the country had recorded population weighted CDDs that were much lower than normal while the western cities experienced much higher CDD totals. Despite the temperature extremes, total population weighted weather for the country equaled out to be about average for the season," Smith said. Readers will note that Smith's observation is evident in the table (Figure 8) column "Cumulative Deviation from Normal" which has a zero value for the last line (United States). Despite all the record cool and hot spots, the net energy demand turned out to be average on a national basis.

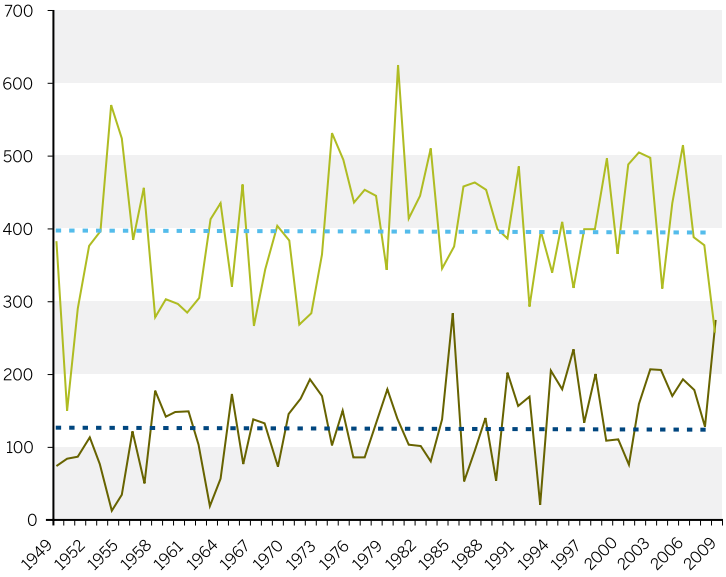
In taking advantage of this netting effect, some of the largest energy companies do have a geographical reach across several regions; this reach can serve as an intrinsic volatility hedge. Others might be integrated in several ways, having operating units all along the supply chain, as well as having regulated and non-regulated businesses. An example is Constellation Energy Group (NYSE:CEG). According to their annual report, Constellation routinely enters into contracts to lower financial risk by hedging many of the uncertainties: fuel requirements, inventories of natural gas, coal and other commodities, supply obligations, purchase and sale commitments, and, of course, weather exposure. To implement this strategy, Constellation reports they "utilize fixed-price forward physical purchase and sales contracts, futures, financial swaps and option contracts traded in the over-the-counter markets or on exchanges." The group's flagship unit is the Baltimore Gas and Electric Company, whose origin goes back to 1816 when it was known as The Gas Light Company of Baltimore. (Baltimore is one of the cities whose weather risk is traded through CME Group products.)

Weather market participants also include dealers who sell protection to companies and institutions seeking to reduce weather risk. MSI GuaranteedWeather Trading Ltd. (MSIGWT) in Overland Park, Kansas, is a global provider of weather risk management products. They offer standard derivative structures, some of which resemble the CME Group futures and options; and they also offer tailor made weather insurance policies through their affiliate, Vortex Insurance Agency, LLC. Brad Davis, President and CEO of MSIGWT, says "Products sold by Vortex are not intended to replace traditional property and casualty insurance, but to supplement such insurance and help protect against significant, but non-catastrophic, weather variations that may result in reduced revenue, increased costs or other disruptions in business operations."

The graph in Figure 9 illustrates just how unprecedented July really was. The west coast heat and the Midwest coolness were so extreme that Kansas City was actually cooler than Portland (by one tenth of a degree Fahrenheit). The average July temperature in Kansas City is 9.5 degrees warmer than Portland, OR.

JULY COOLING DEGREE DAY HISTORY

Kansas City, MO vs. Portland, OR



Kansas City was cooler than Portland in July 2009, the only time this has occured in the 60 year history depicted here.

Kansas City July CDD

Kansas City 60 Yr Avg

Portland July CCD

Portland 60 Yr Avg

SOURCE: MSI GUARANTEEWEATHER TRADING LTD.

FIGURE 9

The marketplace in weather risk management for energy suppliers also includes rainfall hedges. The 6th largest municipal utility in the United States is SMUD (Sacramento Municipal Utility District), whose customers own the utility. SMUD produces and delivers hydroelectric power to serve a portion of its load, and if there isn't enough precipitation in a given year, the shortfall of power is supplemented by generating, or purchasing, more expensive power produced by burning natural gas. A dry winter and spring, followed by a hot summer, can lead to much higher unit costs (more cents per kilowatt hour) for everyone on a SMUD meter.

Since 2000, SMUD mitigated the risk of rainfall uncertainty by going to the weather market. The initial transactions were structured as various financial hedges, including option positions known as "puts" and "collars". Simply stated, "collars" enable SMUD to receive cash from the other party in the transaction, in order to buy replacement power in low rainfall years. In exchange, during rainy years, SMUD pays out cash to the counterparty. The actual formula is based on specified levels of precipitation, and the payments are derived by factoring in the price of electric power in Northern California.

This works well for both sides. Pam Taheri, SMUD's Risk Manager, says "We use these types of hedging mechanisms to help manage weather volatility and to stabilize the price uncertainty for our customer/owners."

However, there can be a downside with this kind of solution. In 2008 there were some surprises as people opened their SMUD electric bills. The extremely active hurricane season back in 2005 (Katrina, Rita and Wilma) led to a steep rise in the price of natural gas, because of the damage to the energy infrastructure in the Gulf of Mexico. The SMUD customer/owners who thought their weather risk was hedged, ultimately found out that they had a "hurricane premium" baked into their electricity costs, because the fuel purchase agreements made in late 2005 were for forward delivery, and those asoaring gas prices flowed to the SMUD expense line a few years later.

Not to be fazed by Mother Nature, CME Group was there to respond with hurricane products. These were futures contracts and related options based on the landfall location, strength and size of named storms during hurricane season: the CHI (CME Hurricane Index). First Enercast Financial's Ben Smith says, "When I speak with people lately, they can't stop talking about what an unusually hot or cold summer they have had, depending on where they live." Actually, as in the Sacramento example, with hurricanes 2,000 miles away impacting costs three years later, it isn't just about where you live. Now we must keep an eye on "OPW" (*other people's weather*) that can affect us financially, too.

J. Scott Mathews is a commodity risk specialist. He manages a branch office and weather desk for an introducing broker firm. His weather market consulting firm, WeatherEX LLC, advises companies, including CME Group, on various aspects of the weather market. Mr. Mathews writes "Weather to Buy or Sell," in the weekend edition of *The Wall Street Journal*.

For more information on Weather products, visit **www.cmegroup.com/weather.**

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