

**R.J. RUDDEN ASSOCIATES, INC.**

**WEATHER RISK MANAGEMENT  
A SURVIVOR OF THE COLLAPSE/DEMISE OF U.S. ENERGY MERCHANTS**

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**INTRODUCTION**

Unquestionably, the operating earnings and cash flows of U.S. energy and utility companies are highly susceptible to weather conditions. Recent multi-year trends towards warmer than “normal” weather have increased awareness to “volumetric risk,” and are making many regulated local distribution companies (“LDCs”) take a fresh, hard look at an array of risk management options, both old and new. These include tariff-based weather adjustments to retail rates, weather insurance, reassessment of historical standards to weather normalization in rate cases, and weather-based financial derivative products. Beyond LDCs, the gas-fired merchant and utility generation sectors are examining the effects of weather on both the demand for power, as well as the cost and availability of natural gas as a fuel. Finally, owners and operators of gas storage facilities have a vested interest in understanding and managing weather risk.

One of the fastest growing and most promising means to manage weather risk has been a broad portfolio of weather-related derivative instruments that have arisen since the mid 1990s. Some of the new products have been developed by a few of the now widely-known energy merchants, while others have become traded on established exchanges. Heating degree-day and cooling degree-day futures, swaps and options, and more complex products derived from these basics constitute an array of promising new alternatives for managing, what has become, too many companies and increasingly onerous weather-related “volumetric risk,” especially for those LDCs that have not been before their regulators in many years for rate relief.

But, with the broad-scale collapse of the energy merchants and a pull back in trading activities, a fundamental question has arisen as to whether or not the weather risk mitigation products would continue to be available and traded in the market for use in the U.S. energy sector. And, even if they continued trading, would they retain the necessary liquidity?

This report addresses those questions. R.J. Rudden Associates, Inc. (Rudden) has conducted a survey of approximately 20 marketers, traders, utility CFOs, and Wall Street representatives to explore the many questions raised by post-Enron events. After providing some background information, we will report the results of our survey, along with conclusions based on our firm’s first-hand risk management experience, as well as secondary research that we have performed.

We are happy to report that the strength of the weather-related derivative market is very high and, in fact, there is arguably greater diversity in products and liquidity now than prior to the collapse/demise of the

energy merchants. For reasons we will discuss, it appears that the Enron implosion has had the opposite effects of those expected: it has caused what appears to be acceleration in the number of financial instrument providers and in the liquidity of the market.

## BACKGROUND

Temperatures that are warmer or cooler than “normal” cause significant fluctuations in the volume of commodity throughput expected on both regulated natural gas and electric utility systems. This is due to variations in consumer demand for energy that are driven by weather-related use such as air conditioning, ventilation, and space heating. In the case of merchant power generators, not only do warmer or cooler temperatures directly impact the demand for power, but also indirectly affect the price and availability of natural gas as a fuel. Further, heat has a direct effect on electric efficiency, since line and transformation losses are greater in hot weather, and electric generators are often de-rated based on higher ambient temperatures.

The effect of weather on utility financial performance and stock value is one of the largest risks to which energy companies are exposed. In circumstances where a company’s earnings and cash flows can be directly correlated with weather conditions, mechanisms and tools exist today that a company may be able to use to manage the financial impacts of weather on their organization. Some regulated utilities have elected to address weather risk in the regulatory process through normalization clauses in their tariffs. However, until regulators accept the use of these tools, as well as provide a fair and symmetrical treatment of the costs and losses and gains associated with their use, the full potential will be limited and the ultimate exposure of the end-use customer to weather risk will be heightened.

The energy merchants were among the first to introduce financial products into the U.S. market for use in managing weather risk. The collapse of Enron and the general demise of other energy merchants have sent shockwaves throughout the energy industry and significant ripples into industries that rely heavily on energy. And, the fallout of Enron did not, of course, stop there. In one way or another, it has descended upon virtually every economic sector. The temporary disabling, or outright collapse, of so many energy merchants has created renewed awareness of counter-party credit and performance risks everywhere, and even for energy companies with strong asset bases and solid credit ratings.

## WEATHER RISK AND HEDGING OVERVIEW

### Weather Risk

Weather conditions create one of the largest uncertainties that U.S. energy and utility companies face. Weather exposes companies to “volumetric risk” due to its impact on their commodity throughput levels and/or demand for their commodity. A third-party survey of several major U.S. utility company annual reports disclosed that 80 percent of the companies cited weather as a major determinant to earnings performance<sup>1</sup>.

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<sup>1</sup> See [www.retailenergy.com/articles/weather.htm](http://www.retailenergy.com/articles/weather.htm). *What is Weather Risk?*

Weather risk is the financial exposure to companies' earnings and cash flows attributable to weather deviations from "normal." It applies to the impacts of warmer or cooler temperatures than "normal" on companies' financial performance and equity values. It also applies to the effects of weather beyond just the impact of temperature deviations from "normal," such as rainfall, snowfall, and wind levels<sup>2</sup>.

The impact of weather risk on utility companies' earnings and cash flows are due to variations in consumer demand for energy that drives the quantity of throughput deliveries to the consumers attached to their physical systems. In the case of merchant power generators, weather risk is associated with the volumetric demand level for their commodity production of power.

Weather risk can produce negative or positive financial impacts on companies' earnings, cash flows and equity values. For purposes of this paper, weather risk management refers to managing the negative financial impacts of weather-related "volumetric risk," and/or to developing stabilized and predictable cash flows and earnings for a company<sup>3</sup>. Fundamental and highly-recognized examples of weather risk that can negatively impact financial performance are:

- Warmer than "normal" winter temperatures reduce demand for fuel used in heating
- Cooler than "normal" summer temperatures reduce energy used for cooling

Weather risk is unique relative to other risks that energy companies face in that it is geographically localized and volumetrically driven. It needs to be differentiated from natural gas and power commodity price risk for which there are many financial products, instruments and mechanisms readily available and used in the U.S. energy sector.

To the extent that quantitative analyses can be used to establish the level of correlation between an energy utility's or a merchant power generator's earnings and cash flows with localized weather conditions, financial products can be developed to transfer an organization's weather risk to a third party<sup>4</sup>.

## WEATHER RISK HEDGING INSTRUMENTS

There has been tremendous growth in the availability of weather-related "volumetric risk" hedging instruments for use by the U.S. energy companies. These instruments are structured to facilitate the transfer of a company's weather risk to a third party that is more willing or capable to handle the risk. Just as with other financial and derivative products in the energy market for risk transfer, the terms and conditions of an instrument must be mutually agreed and acceptable to both the organization and its counter-parties to such an instrument.

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<sup>2</sup> Rainfall, snowfall, and wind levels could impact a power generator's ability to produce sufficient electricity to meet power consumers' demand for their electric (e.g., if water or wind is used as a source of energy to generate their electricity commodity).

<sup>3</sup> E.g., In managing risk to stabilize and create predictable earnings and cash flows, the company may forego the potential positive financial impacts of weather "volumetric risk," in exchange for lowering the cost of mitigating the negative financial impact of the weather "volumetric risk,"

<sup>4</sup> For a more detailed description of the process and quantitative analyses required to establish a correlation between earnings and local weather temperatures that is necessary to develop an effective financial product for use in hedging weather risk, see the Chicago Mercantile Exchange website ([www.cme.com](http://www.cme.com)), Industrial Commodity, Weather Strategy Papers, Index Papers, Weather Risk Management – "Weather Risk Management at the "Frozen Falls Fuels Company," by Bob Dischel, Ph.D., CCM.

## Suppliers of Hedging Instruments

Energy merchants led the development and introduction of weather-related risk management products into the U.S. energy sector. Aquila, Enron and Koch are generally recognized as the first parties to arrange and issue weather-related risk products into the U.S. starting in late 1996 and 1997.

In 1999, the Chicago Mercantile Exchange (“CME”) launched the first public exchange-traded, temperature-related weather derivatives. Winter season heating degree-day (HDD) and summer season cooling degree-day (CDD) futures are traded on the CME for ten U.S. cities<sup>5</sup>.

Today, there are several counter-parties that may be willing to assume the weather risk exposure of an energy company, such as:

- Insurance companies
- Commercial banks
- Large energy companies
- Energy merchants

## Common Instruments Available

Weather risk instruments are available both in the over-the-counter market, and on the CME. Financial instruments commonly available for use in hedging temperature-related weather risk are:

- Swaps/Futures – These are intended to effect stabilized cash streams to an energy company, where the company and its counter-party agree to exchange payments based on actual temperature as compared to an agreed strike level. With the swap, the energy company locks in earnings to a “fixed normal” degree-day level, while it’s counter-party assumes a “floating” degree-day position. The exchange of payments may be limited to certain caps for the counter-parties.
- Options – These are used to establish floors, caps or collars on temperature earnings effects, where the energy company purchases the right, but not obligation, to effect payment from a counter-party should actual temperatures be greater than or lesser than the agreed floor or cap temperature. Collars may also be used to provide earning’s protection within a defined range.

These instruments are available in multiple forms, ranging from a pure insurance contract used to effect payment if the actual temperature is greater than or less than an agreed level; they may be embedded into other agreements, such as a physical purchase/sale agreement; or they could cover a single month or multiple months with a single strike level for all months, or a strike level that varies by the month covered by the instrument.

## Utilization of Weather Risk Management Instruments

The growth in the use of weather-related “volumetric risk” hedging instruments has been tremendous during the past few years. The results of a recent Weather Risk Management Association (“WRMA”) and PricewaterhouseCoopers (“PwC”) joint study released in early June 2002 found that during the period

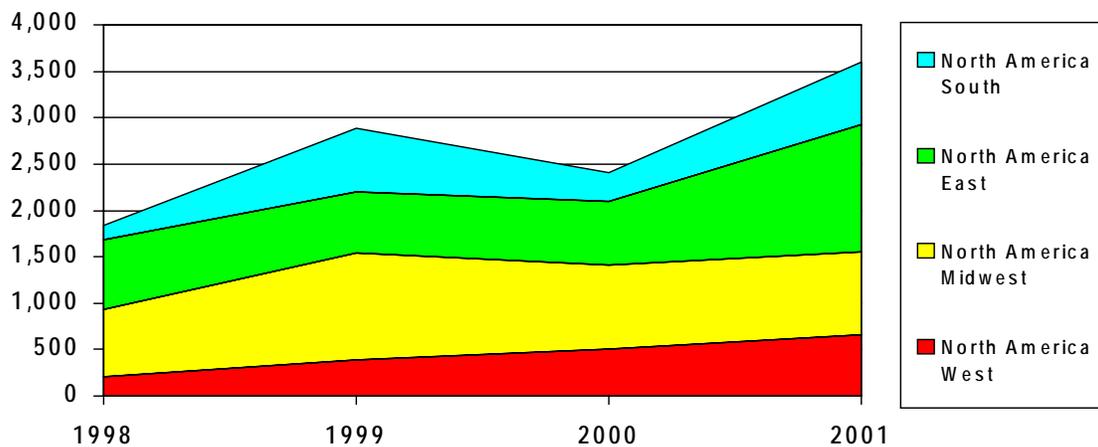
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<sup>5</sup> The cities are: Atlanta, Chicago, Cincinnati, Dallas/Fort Worth, Des Moines, Las Vegas, New York, Philadelphia, Portland and Tucson. The CME futures are discussed in further detail subsequently herein.

April 1, 2001 to March 31, 2002, approximately 2,700 weather transactions were completed in North America. This represents an approximate 300 percent increase in the number of weather-related transactions as compared to the year 1998.

The study also found that during the period, the value of weather-related hedging instruments climbed to about \$3.6 billion in North America. The growth in the value of completed weather transactions can be seen in the following Figure.

**Figure 1**  
**WRMA/PwC Survey Findings<sup>6</sup>**  
**Notional Value of Instruments (\$ millions), 1998-2001**



Source: WRMA/PwC Survey for April 2001 to March 2002

The significant growth in the number and notional value of weather transactions over the past few years is attributable to the greater availability of weather “volumetric risk” management products, their applicability to a greater number of industry segments, and greater awareness and understanding of the product offerings.

“The results of this survey (i.e., WRMA/PwC Survey) show that our educational efforts are paying off,” says Valerie Cooper, executive director of WRMA. “We’re seeing more end users coming to the market looking for weather hedging products as opposed to providers having to go to the end users. That’s a significant development.”

<sup>6</sup> The number of weather transactions and their associated value reported in the study relates to all survey respondents’ industries in North America; however, the vast majority of the transactions were in the U.S. energy sector. Weather-related transactions reported were for all types of weather conditions, and approximately 85 percent of the transactions were associated with cooling degree-day and heating degree-day conditions. The remaining 15 percent were for rain, snow, wind and other weather events.

## Structuring and Terms For Weather Instruments

Weather-related “volumetric risk” hedging instruments must be tailored to an individual company’s situation with an understanding and consideration of such items as:

- The specific individual and portfolio of weather risk faced by the company;
- The weather risk that the energy company wants to hedge (e.g., heating degree-day, cooling degree-day), the hedge objective and the term to be hedged (e.g., winter season, summer season, 1-year, 5-years, etc.);
- The type, level and location of historical and projected weather data available;
- The measurement to which the instrument is to be indexed (e.g., base standard degree-day temperature of 65 degrees Fahrenheit, “normal” temperature as compared to 10-year prior, 30-year prior average);
- Regulator(s)’ receptiveness to use of weather-related risk hedging instruments and their attitude toward cost recovery; as applicable; and
- Last, but not least, the cost of the hedge instrument relative to the financial exposure intended to be hedged (e.g., company earnings per degree-day effected by weather volatility).

## SURVEY RESULTS, ISSUES AND TRENDS

The energy merchants were among the first to introduce financial weather-related risk hedging products into the U.S. energy market. We conducted an analysis to determine whether the collapse of Enron and demise of other energy merchants have impacted the availability and/or use of weather derivatives, weather insurance and other similar financial products by U.S. energy companies.

### Survey Methodology

In our analysis, we made inquiries to approximately 20 individuals that our research disclosed are experienced in weather-related risk management in the U.S. The selected individuals are either currently directly involved with weather risk management, or have been involved with such in the recent past.

Our inquiries were made via telephone, on an informal basis, with assurance of confidentiality of the respondents’ comments unless otherwise agreed<sup>7</sup>. We explored the individuals’ views as to what effect the collapse of Enron, and the general demise of the other energy merchants, had on the overall availability of weather “volumetric risk” financial products to U.S. energy companies. This discussion was followed by soliciting their views as to whether the collapse of energy merchants had any impact on the use of weather-related risk management financial instruments in the United States.

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<sup>7</sup> Confidentiality was critical to securing the respondents views due to concerns of “guilt by association” if they personally, or their organization, were perceived to be like the energy merchants and swept into the overall negativity and lack of confidence that surrounds the U.S. energy merchants at the present time.

## Survey Results

1. The collapse of Enron and the general demise of energy merchants has had a relatively small impact on the availability of weather-related risk management products. Any void that occurred in the market was quickly filled by other product suppliers. Further, events in the energy merchant sector have actually appeared to increase instrument liquidity and expanded the availability of products. This is attributable to experienced weather-related instrument resources movement to other companies that were looking to enter or expand their activities in weather risk products.
2. Counter-party credit and performance-risk awareness continues to be very high, and this is driving a substantial increase in heating degree-day and cooling degree-day futures that are being traded on the Chicago Mercantile Exchange.
3. The use of weather-related “volumetric risk” management instruments by U.S. energy companies has not been impacted, and we expect will continue to grow rapidly over the next five to ten years.

## ISSUES AND TRENDS

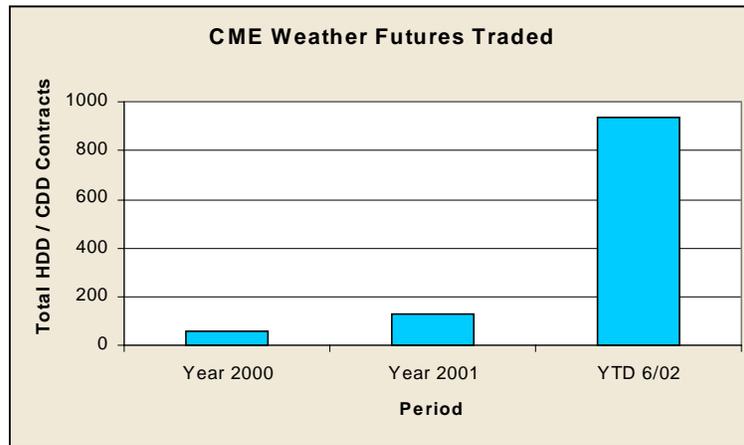
### Chicago Mercantile Exchange Weather Futures

In the survey, we found that the growth in level of trading of CME weather futures has been significant. In May 2002, the CME announced that Wolverine Trading, L.P. (“Wolverine”) would serve as a Lead Market Maker in the CME’s weather futures contracts.

The CME weather-related futures are significant to U.S. energy companies in managing their weather related “volumetric risk” in many ways:

- The CME provides an alternative source of weather risk management financial products to fill any temporary void in the over-the-counter market that might arise by further collapse, demise or implosion of the energy merchants;
- The CME clearing house acts as the third party to every contract trade, which helps to ensure the integrity of all trades, and is viewed as reducing counter-party credit and performance risks;
- The naming of a Lead Market Maker is expected to improve liquidity of the CME weather futures market, to make the futures more accessible to companies, and to provide more ready access to contract bid and offer prices for intelligence and benchmark to the over-the-counter market; and
- Provides a mechanism that an issuer of over-the-counter weather risk financial products may be able to use in hedging the weather risk that it assumes as the counter-party to weather-related financial products.

The level and growth in the level of trading in CME futures contracts can be seen in the following chart:



Source: Chicago Mercantile Exchange (7.16.02)

Total 2002 year-to-date CME weather futures traded have surpassed 1,000 contracts in July 2002, representing a year-to-date 2002 growth of more than 600 percent, as compared to the total contracts traded during the entire year 2001, and a growth of almost 1,600 percent compared to the entire year 2000.

Two important points to make regarding the use of CME weather futures are: 1) if the weather risk that an energy company wants to hedge is not one of the ten cities listed by the CME, then the company will continue to have “basis” risk between the geographic location that the company wishes to cover with its hedge, and the city provided for in the CME future; and 2) to trade futures on the CME, the company must have the financial resources and the level of sophistication, understanding and experience critical to effectively trade futures on a public exchange.

### “Normalization Clauses,” Regulatory Solution to Weather Risk

The regulatory ratemaking process has been used by some natural gas and electric utilities to address and mitigate their weather risk. This has worked well for some utilities and, generally, the winter season calculation period used to determine the normalization adjustment ranges from the October/November through March/April (for heating degree-days) timeframe, with either a “real-time” billing adjustment or a time lag of at least one season. Whether tariffs structured with performance-based rates reduces or eliminates utilities’ needs for normalization clauses to mitigate weather-related “volumetric risk,” will continue to be debated for some time to come.

### Resource Skill Sets and Expertise

According to those interviewed, there will be a growing requirement for independent advisors with the unique skill sets and expertise required to support energy companies in quantifying, analyzing and defining viable strategies and tactical options that can be used to manage their financial exposures to

weather risk. These advisors will not have conflicting economic interests, or any stake in the specific products chosen by the energy company to manage its weather risks.

## CONCLUDING COMMENTS

Practically every day in the U.S. energy sector, new “surprises” surface that range from ethical transgressions, civil and criminal investigations, hidden transactions, disguised loans, over-inflated earnings projections, to flat out misrepresentations of financial position or results. Investor and public confidence in energy companies’ financial statements, and in the auditors of those statements, is close to an all time low (if not already at its lowest level ever).

An interesting outcome from the collapse and demise of energy merchants is that in order to maintain equity values, companies’ focus on avoiding any type of “surprises” to their stakeholders will be an even higher priority. We expect that this will result in increased attention to identifying and explaining all the business and transaction risks that the companies face, plus will increase the focus on managing components of earnings that contribute to earnings volatility, to the extent possible.

Since weather risk creates one of the largest financial uncertainties that energy companies may be exposed to, proactive weather risk management will be of keen interest to energy company management. The financial products, tools and mechanisms exist today to hedge, at least partially, the negative financial exposure to energy companies of their weather-related “volumetric risk.”

## ABOUT THE AUTHORS

Donald L. Sytsma has more than 20 years of experience in the natural gas and energy industries as an auditor, pipeline company manager and controller, business consultant and expert witness. His experience encompasses virtually all sectors of the energy industry including natural gas marketing, transmission and transportation, distribution, storage, power generation, and exploration and production. His diverse upstream and downstream industry experience provides a complete understanding of the business dimensions, information requirements, systems and process needs, trading and marketing requirements, and regulatory challenges associated with both regulated and non-regulated entities. Mr. Systma holds a B.A. in Accounting from Indiana University.

Greg A. Thompson has more than twenty years of energy industry experience primarily concentrating in natural gas marketing and trading, and pipeline transportation. His direct industry experience includes selling energy supplies to local distribution companies, power plants, national commercial accounts and individual industrial consumers. He has also had responsibility for purchasing supplies to serve the consumers, managing producer supply portfolio, securing pipeline capacity rights and managing the delivery of supplies from the supply source through to the final point of consumption. He has direct regulatory experience in pipeline tariffs, FERC orders, and individual pipeline operational issues. He also participated in developing regulatory language for pipeline companies and a rate cases.

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R.J. Rudden Associates, Inc. is among the world’s premier strategic, economic and management consulting firms specializing in energy matters. Additional information is available on Rudden’s web site at [www.rjrudden.com](http://www.rjrudden.com).