Protecting Winter Profits

With effective tools to hedge weather risk, the heating fuel industry welcomes winter

The 2003/2004 winter heating season opens to a reinvigorated weather risk management industry reflecting, to a large extent, the changes in the merchant energy industry where the weather market originated. Stronger, more credit worthy players, such as insurance and reinsurance companies, investment banks and the more substantial energy merchant players, have emerged as the leading providers of risk management products and services. According to the latest annual survey undertaken by the Weather Risk Management Association (WRMA) and PricewaterhouseCoopers (PWC), the number of weather derivatives contracts increased from April 2002 to March 2003 by over 300%. This reflects increased interest in Asia and Europe, as well an increase in the number of contracts traded on the Chicago Mercantile Exchange (CME).

The dramatic increase in trading Heating Degree Day (HDD) futures and options contracts, both monthly and seasonal, on the CME is also a highlight of this season. A recognition of the value of CME's weather contracts, as well as industry concerns about creditworthiness, have encouraged market participants to lay off some of their risk via the CME. A reflection of the growth of the exchange-traded HDD market has been the addition of more US cities and seasonal futures and options contracts, totalling 15 US cities with monthly HDD contracts and 10 US cities with seasonal contracts, traded on the CME's GLOBEX® electronic trading platform. On 3 October 2003, the CME added futures and options contracts for five European cities to round out its broad portfolio of weather contracts.

This is excellent news for those needing to hedge volumetric risk associated with the variability of HDDs, both from the distribution and consumption sectors, as the variability in temperature-linked consumption results in risk to corporate revenues.

Heating oil and propane distributors need to manage a broad array of risks during the heating season. Customer conversion to natural gas has recently abated somewhat due to the higher natural gas prices, but customer retention is still a serious concern in the heating oil and propane sectors. Distribution companies address these concerns through enhanced customer service programmes and an expanded menu of pricing options. However, this trend also heightens the need for disciplined hedging programmes. Distributors must manage the operational risk involved with the logistics of moving, storing and delivering supplies to customers on a timely basis. Finally, it is crucial to manage volumetric risk, or the risk due to variability in sales revenues, caused by weather-related fluctuation in levels of consumption.

The extreme variability in the last several winters in the northeast US, reflected in the HDDs at New York City's LaGuardia airport, for example, illustrates the risk to distributors posed by unpredictable fluctuations in weather. The risk of revenue loss is obviously due to much warmer-than-normal winters, but extremely cold temperatures bring other risks, including the possibility of having to replenish supplies at weather-induced high prices. The extreme variability associated with temperatures in New York City is illustrated in figure 1. The sharp divergence from 2002 to 2003 alone illustrates the dramatic swings that are possible due to weather variability.

As a result, an increasing number of large and small companies are now incorporating formal risk management programmes including weather insurance to hedge volumetric risk. Through the use of these tools, companies are able to isolate risks largely attributable to weather and hedge them appropriately.

CONSTRUCTING A WEATHER HEDGE

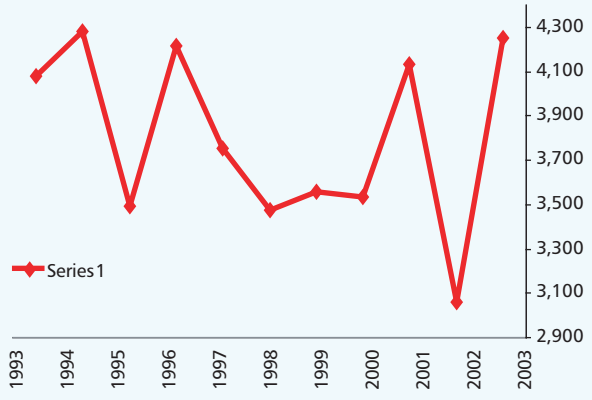
Step 1: Quantifying risk

The first step involved with constructing a hedge involves defining and quantifying risk.

This has three components. First, variability in consumption per HDD must be determined. Second, a dollar amount must be assigned to this variability and third, individual customers must be aggregated around certain geographic locations.

Household and commercial heating oil consumption is determined by occupancy, behaviour, unit efficiency and temperature. In order to keep customer tanks supplied, companies maintain detailed

Figure 1: The winter temperature highs and lows of New York



Average number of HDDs recorded at LaGuardia Airport, New York, November-April 1993 – 2003

consumption data for individual household consumption based on HDD days, which is continuously adjusted for accuracy, based on actual consumption.

Next, this variability in consumption per HDD must be quantified in terms of revenues. The profit margin per gallon must be calculated using the difference between cost of supply and retail price, multiplying it by consumption changes per HDD change. This would calculate the firm's potential loss of revenue posed by weather variability. Next, individual households and commercial customers should then be aggregated around certain geographic locations to determine a "consumption at risk" profile for the entire customer base for a particular location. This should be calculated for the entire heating oil season, from November to April.

Step 2: Correlate customer locations to key benchmark cities

The second step is to determine the relationship of those customer locations to tradable cities. A distributor's exposure needs to be correlated with tradable cities to determine the appropriate location to choose for the hedge. If moderate to strong correlations exist with the CME-listed cities, then the distributor might use the CME contracts to construct his hedge. For the most conservative hedge, a company would buy HDD puts to hedge a decided-upon dollar amount exposure should HDDs be less than normal.

Once the distributor understands the weather exposure and the location mix, and has concluded that the correlation to CME contract cities is sufficient, the next decision is how to construct the hedge.

Step 3: Evaluate various HDD hedge strategies

The third step is for the distributor to evaluate various alternatives for the construction of the HDD hedge. Once the distributor is able to quantify how much risk he has per degree day fluctuation in temperature, he can choose from a number of possibilities. The alternatives include selling an HDD seasonal futures contract, buying an HDD put – or, if option cost needs to be minimised, buying a collar (buying a put and selling a call above the HDD average price). Another strategy which would reduce the option premium cost would be to buy a put spread. This would involve buying a put at a certain strike price and selling a more "out of the money" put against it. This would not limit the windfall associated with above average number of HDDs but would reduce the potential payout if HDD levels dropped below the level of the put sale.

The advantage of selling the futures contract is that no upfront option premium must be paid. However, the number of HDDs for a season is then fixed, so that if HDDs go above that level there is no windfall associated with additional HDDs. If an option strategy is chosen, the distributor must determine the amount of premium he wishes to pay for a certain level of protection.

Other factors for consideration

These strategies involve the risk to a distributor if HDDs are less than average. There may, however, be risks associated with a colder-than-normal winter. According to one large heating oil distributor in the northeast US, the much colder-than-normal winter of 2002–2003 resulted in high costs to honour agreements to service customer boilers, which were breaking down because of continuous operation in the cold weather.

A further problem associated with a cold winter can be additional commodity price risk to source additional supply if the weather is much colder than expected. Buying additional supply at cold weather-induced price spikes can be punishing. Purchasing an HDD call at a strike at a higher HDD level might be added to a hedge programme as catastrophic protection against higher commodity costs associated with unexpected cold.

Hedging example

Let us assume that a northeastern US distributor has determined that his New York City revenues will fluctuate by $5,000 per degree day and that he would like to hedge his volumetric exposures with the CME seasonal HDD options. These aggregate HDDs from November to March, have strikes at 50-point intervals with each HDD fluctuation representing a payout of $100. He decides that he would like to hedge by buying a put spread covering the risk between 3650 and 3350 for a maximum payout of 300 heating degree days. Since the CME contract represents a fluctuation of $100 per HDD, he decides to purchase up to 300 degree days protection by buying 50 March 2004 3,650 puts and selling 100 March 2004 3,350 puts. At current prices, he would buy 50 contracts of 3,650 puts at 70 and sell 50 March 2004 puts at 14 for a premium of $280,000 for the season. If HDDs drop to 3,350, he would receive a maximum payout of $1.5 million. (Prices as of 17 October 2003).

While the trading volume and the number of cities listed on the

US HDD futures and options contract specifications[1]

	Monthly HDD futures	Seasonal HDD futures
Contract size	$100 times the seasonal index	same
Quotation	1 degree day index point	same
Minimum price increment	One HDD index point	same
Tick value	$100	same
Months/seasons traded	Individual months for Oct, Nov, Dec, Jan, Feb, Mar, April	Season November - March
Cities traded	Atlanta, Chicago, Cincinnati, New York, Dallas, Philadelphia, Portland, Tucson, Des Moines, Las Vegas, Boston, Kansas City, Sacramento, Houston, Minneapolis	Atlanta, Chicago, Cincinnati, New York, Dallas, Philadelphia Portland, Tucson, Des Moines, Las Vegas
Options	European style exercise strikes at 50 point increments	same

European HDD futures contract specifications[1]

	Monthly HDD futures	Seasonal HDD futures
Contract size	£100 times the degree day index	same
Minimum price increment	1 degree day index point	same
Tick value	£100	same
Months/seasons traded	Individual months for Oct, Nov, Dec, Jan, Feb, Mar, April	Season November - March
Cities traded	London, Paris, Amsterdam, Berlin, Stockholm	London, Paris, Amsterdam, Berlin Stockholm

[1] For up-to-date data and complete contract specifications, please visit CME's website at: www.cme.com/weather

Source: CME

CME have increased, the customer may decide that becaue of his location mix, he may wish to enter into a more customised hedge with a dealer. One sophisticated northeastern US distributor reports that after extensive analysis of his location exposure, he has isolated his risk to eight different cities in the northeast. He works with various dealers to get a customised hedge, hedging 10% of his revenues from 1 November to 31 March with an OTC HDD put.

Felix Carabello, associate director, weather futures, at CME, encourages the weather hedger to choose the solution which is best for him, whether it be on the CME or using a customised solution with an OTC dealer. "Providing a marketplace with standardised contracts at selected locations will stimulate development of the market as a whole. Liquid exchange-traded and exchance-cleared contracts will serve to provide a foundation to the weather market as it continues to develop", he says. Large heating oil distributors currently using the weather market to hedge agree. While many are using the dealer market now, they view the CME contracts as a valuable source of price transparency and information exchange relative to the growing linkage between the weather markets and commodity pricing.

Large commercial consumers of heating fuel which have the opposite risk profile could benefit by hedging consumption of heating oil or propane by the same process, evaluating changes in consumption per degree day per facility, aggregating by location and hedging by buying HDD calls or futures, call spread or collars to hedge expenses associated with increased consumption of heating fuels during the winter season. WR&R

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