

# Weather Risk Management

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*Weather conditions affect the overall economy. Whereas catastrophic events (floods, storms, etc.) are managed via insurance systems, with indemnification of defined losses, normal meteorological variations can only be managed through organized and informed planning initiated by a company.*

*OTC Conseil can help you step-by-step in this approach, from the identification of your company's weather sensitivity to the transfer and optimization of associated risks. Why not benefit instead of suffer from variable weather conditions?*

## Climate, weather and catastrophes

First, let's start with two typical examples of weather sensitivity for two major summer consumption patterns, air conditioning and beverages:

- On a hot summer day in NY State, a one-degree increase in temperature increases electricity demand by more than 600 MW, equal to adding Buffalo, Rochester and Syracuse to the power grid. That is also equivalent to the capacity delivered by a nuclear plant like Nine Mile Point Nuclear Station - Unit1 (Oswego County, NY).
- With an increase in temperature from 20°C (68°F) to 30°C (86°F), beer and soda consumption doubles!

Differentiating between climate and weather on the one hand, and weather risk and catastrophe risk on the other, is key.

### ***A question of scale (time and space)***

Climate can be seen as the long and large version of weather. Climate is measured using the means and trends of atmospheric parameters (temperature, rainfall...) on a regional or continental scale, while weather can be analyzed using precise instantaneous parameters on a very local scale. For instance, +/- 1 degree is considered to be a small weather variation, whereas +/- 1 degree is a huge variation for the climate. That is why +2°C can, over the course of a century, lead to a global environmental catastrophe, whereas +2°C tomorrow as you head off to work in the morning is a barely noticeable difference.

## ***A question of size (probability and severity)***

Weather risks are to be distinguished from catastrophic risks. Catastrophic risks are characterized by their low probability and high intensity, and are usually covered by insurance contracts, indemnifying defined losses. On the other hand, weather risks are “normal”: very probable but not intense. These cannot be covered by a classic insurance policy and therefore their proper management mandates a dedicated risk management process.

## **Weather risks and weather sensitivity**

Whereas weather is omnipresent in our daily lives and factors into everyday conversation and moods, it is rarely addressed when talk turns to serious topics, such as the economy. But in fact, most sectors of the economy are weather sensitive to varying degrees. In the US, for instance, it is estimated that weather risks (except storms and catastrophes) impact :

- 20-30% of GDP
- Up to 60-70% of GDP, after taking indirect effects into account
- Between 20%-40% of industrial production
- 80% of companies.

...that amounts to several billion dollars on a global scale.

Nearly all companies exposed to weather-related risk are aware of their exposure, but almost none actually manage it. From a transverse operational risk (ex. employees commuting to work), to a specific risk affecting production (ex. site frequentation; equipment operation), meteorological parameters are influent on the whole economic spectrum.

## ***Supply and demand***

Both supply and demand are affected by weather, especially for the mercantile economy. The consumption and demand of goods and services is extremely weather sensitive, particularly in the entertainment, clothes, energy and agro-food sectors. On the supply side, the energy sector is also very concerned, mainly for renewables, as their capacity for electricity production depends on wind, sun and rain conditions.

A few more/less degrees can effectively paralyze entire blocks of the economy: construction, agriculture, transportation, etc.

## ***Risk Management***

Whereas for most companies financial risks have occupied a central position in the risk management paradigm for several decades, weather risk management is still largely under-utilized. Still, weather volatility variables are comparable to financial ones. Only a few sectors (like electricity production) are traditionally very active in weather risk management. The effects of weather-related uncertainty on operations and results are only sometimes acknowledged and therefore rarely taken into account in a sound and quantitative manner. Those cannot be covered by classic insurance and therefore necessitate a dedicated risk management process.

- Typical volatilities for meteorological parameters, compared to annualized financial volatilities of similar magnitude :
- August mean temperature (UK) – Euro-Dollar: 10%
- Wind in July (Netherlands) – Stock markets indexes (“normal” period): 20%
- Spring rainfalls (Paris) – Commodities (Oil): 40%
- June rainfall (Paris): 100%

## **Our approach, from identification to optimization and transfer**

OTC Conseil offers organizations, companies and institutions services to optimize their weather sensitivity according to these five guiding principles:

### ***Identification of weather sensitivity***

The first step is to identify in the company’s data set (such as frequentation [number of visitors], revenue, sales volumes...), a signal sensitive to one or several meteorological parameters (temperature, rainfall, wind, cloud cover...).

### ***Weather sensitivity analysis***

It is crucial to identify and quantify weather sensitivity as precisely as possible from the viewpoint of a company’s needs and practices, in the context of earnings. This is done by identifying whether a signal comes from consumers, producers or suppliers and by understanding which factors are linked and how. For example, if the number of visitors to a site is contingent on sunshine, it is necessary to also take into account that a visitor’s decision can be related to other factors as well, including his route there, the time he estimates spending there, and the alternative choices that could become less interesting in the event of sunshine. Is there any threshold after which the trend is opposite? Why? Etc.

### ***Managing Performance***

Weather risk management starts by tracking the effects of weather and to duly report them. Separating the effects of endogenous and exogenous (weather and socio-economic) parameters in the company’s results is also a way to highlight the impact of the economic climate/trend, especially in situations of crisis. Identifying that x% of the quarterly results are influenced by the weather is indeed a very strong financial communication input. Adequate performance attribution tools and reporting can therefore be established for a company’s financial management and its board.

### ***Optimization***

Benefiting from or mitigating the impact of weather variations on revenue requires the implementation of new products and/or management. Depending on both the degree of sensitivity highlighted in the data/weather analysis and the chosen degree of optimization, it is necessary to either adapt to this new vision of risks, or to create a new activity.

When the weather sensitive factor is directly linked to the consumer/client, the opportunities are essentially on the side of marketing and supply strategy, whereas a weather sensitive production/operation will need to focus on logistics, provisioning, processes or staffing. The specificity of weather hazards -- whatever their intensity and probability -- is related to their predictable aspects, under certain conditions and precautions. These forecasts, ranging from the hourly to the seasonal, can thus be integrated into management tools, e.g. anticipating a level of demand.

From a marketing point of view, it is sound to construct special campaigns focused on seasonality and weather, and indeed to create new products and programs that take advantage of those. In different sectors, new initiatives have been recently released: a supermarket chain that proposes discounts on ice cream above 30°C (86°F), for instance, or an energy supplier that proposes a temperature-dependant price grid.

### ***Financial hedging***

Another approach depends on transferring the weather risk. A financial hedge can be set up, to hedge losses due to weather exposure above a certain limit. This will result in smoother results. These types of hedges can be set up yearly, or as otherwise appropriately scheduled, to insure a commercial event. The basic concept here is that some activities benefit from particular weather conditions while others do not. Then, the goal for a weather sensitive company is to precisely define the characteristics of the hedge, and to construct it with the guidance of a specialist in weather hedge contracts, from an insurance or banking institution.

Here are a few examples of weather financial hedges

- **Maximizing Results/Mitigating Losses**
  - Ski resort facing low snow conditions
  - Manufacturer of outdoor garments facing a warm winter
- **Insuring commercial events**
  - Snow/sun guarantee(s) for tourism
  - Refund if item(s) bought cannot be used due to unfavorable weather conditions

### **Our collaboration with Metnext**

Quantification of weather sensitivity is a key step that requires expertise in meteorology, weather/economy modeling capacity, and good quality data. Metnext, a subsidiary of NYSE-Euronext and the French national weather agency, works with us through the quantification phase, and to build operational indicators. Precise and relevant, these indicators can be used in analysis or forecast mode, by the operational or management teams.

See also:

[http://www.otc-conseil.fr/fre/High/publications/lettre-otc/1841/lettre-otc-sept-07\\_n-33.pdf](http://www.otc-conseil.fr/fre/High/publications/lettre-otc/1841/lettre-otc-sept-07_n-33.pdf)  
(p.22-26)

<http://www.otc-conseil.fr/fre/publications/lettre-otc/lettre-n-37-septembre-2007/l-assurance-au-coeur-des-chanege.html>

<http://www.otc-conseil.fr/fre/newsletters/lettre-n-38/risque-environnemental.html>

[http://wrma.org/documents/WeatherRisk\\_What\\_Every\\_CFO\\_Needs\\_to\\_Know\\_Now.pdf](http://wrma.org/documents/WeatherRisk_What_Every_CFO_Needs_to_Know_Now.pdf)

<http://www.cmegroup.com/trading/weather/>

<http://www.metnext.com/spip.php?article129&lang=en>