

# Climate Change: A Global Concern

## The challenges of insuring the search, discovery and new uses of alternative energy sources

*Climate change, specifically global warming, commands the attention of the global community. It drives political debate, scientific study and the response of the media. The focus coincides with the rapidly rising costs of fossil fuels. People feel the cost in every facet of their lives — heating homes, driving cars, cost of airline tickets, and food prices. The combination — a growing environmental conscience and the costs of and dependency on fossil fuel — has created a resurgence in the pursuit of alternative energy sources. Government programs and incentives are accelerating the resurgence and making renewable energy the world's most rapidly growing energy segment.*

XL Insurance is focusing specifically on risks associated with certain solar and wind energy resource niches. Wind and solar projects risk a loss of production during unfavorable weather conditions. The sensitivity is new to utility systems, e.g., there used to be very little concern about a lack of wind. Having grown to thousands of megawatts the industry faces such risks more than ever before.

Although they may sound new, alternative energy sources, specifically for the generation of electricity, have been around for a long time and include:

**PHOTOVOLTAICS (PV)**, the conversion of light directly into electricity, has been around since the early '50s and has been used in space since the '70s, providing electrical power for satellites. The first PV systems generated electricity to pump water, charge batteries and supply power directly to the utility grid. PV is believed to be the world's fastest-growing energy technology.

As reported in the January 2008 *Solar Energy*:

*"Production of (PV) jumped to 3,800 MW worldwide in 2007, increasing an estimated 50 percent over 2006. According to preliminary data compiled by the Earth Policy Institute, cumulative global production stood at 12,400 MW at the end of the year.*

*"Japan, China, Germany, Taiwan and the US represent the top five PV-producing countries, the Institute says, adding that the US is the global leader in thin-film PV.*

*Overall, thin film grew from four percent of the market in 2003 to seven percent in 2006. The EPI anticipates that thin film could claim 20 percent of the market by 2010."*

The commercial use of solar power is growing (See Sidebar: *Major Solar Energy Projects*) and XL Insurance is receiving an increasing number of inquiries as to the insurance products it is offering this market.

**WIND ENERGY** enjoys similar growth. Rising by more than 5,000 MW, the U.S. fleet of wind generation reached 16,818 MW last year. Such levels are enough to power 4.5 million average American homes. Wind, as characterized by the National Renewable Energy Laboratory (NREL), "... is a clean, inexhaustible, indigenous energy resource that can generate enough electricity to power millions of homes and business, and is also one of the fastest-growing forms of electricity generation in the world." Industry experts predict that, with proper development, wind energy could provide 20% of the nation's energy needs.

### COVERAGES

Investors in PV or wind systems as well as buyers of the electrical output are concerned about risk of damage and potential subsequent loss of revenue. And, when sunlight or wind averages do not live up to expectations, then protection is needed to cover the revenue streams. XL Insurance offers standard all-risk operational and construction, business interruption and weather-related products to meet these needs.




---

Investors in PV or wind systems as well as buyers of the electrical output are concerned about risk of damage and potential subsequent loss of revenue. And, when sunlight or wind averages do not live up to expectations, protection is needed to cover the revenue streams.

---

XL Insurance also is in the process of exploring and perhaps developing highly specialized products. There is interest from lenders of investment capital to get some kind of efficacy/warranty cover. Providers of solar power typically will enter into power purchase agreements that run for 20 to 25 years primarily to have a steady revenue stream to pay back the financial entity, e.g., bank, finance capitalist, sponsoring a project which can cost \$50, 100, 200 million. To guarantee there will be a revenue stream to repay them, lenders want to be certain that the energy field will produce the electricity it promises; in other words, that both the equipment

will operate as touted and that the output that is projected will be maintained within reasonable variations.

The efficacy/warranty issue is difficult because it is so close to being an actual business risk: will the equipment last over 25 years and what are the potential effects of maintenance variables? However, there is a need, and XL Insurance is taking a close look.



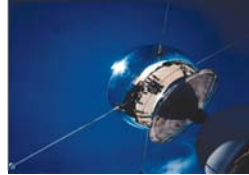
**WEATHER INSURANCE**

Weather risk — the occurrence of an observable weather event or variability in a measurable weather index — can impact

the bottom line of utilities and other businesses, creating earnings volatility caused by changes in temperature and precipitation. Weather risk can cause losses either to profits (lost revenue and/or higher expenses) or property.

In addition to supporting the development of alternative energy, XL's Weather and Energy team specializes in coverages for weather-related exposures that often do not make the headlines. For example, a natural gas utility suffers from reduced sales during a mild winter. Alternatively ski resorts often suffer severe economic losses when a lack of snow and mild temperatures reduce attendance.

XL Insurance is writing weather and energy coverages for companies that made past investments in weather-sensitive infrastructures and now face exposure as they try to adapt to the warming environment. Many cannot nimbly change and/or find change extraordinarily expensive. XL can insure the economic losses they may incur while laying out significant capital while

<p><b>3rd Century B.C.</b> Recorded use of mirrors to light torches</p>		<p><b>1908</b> William J. Bailey of Carnegie Steel Co. invents a solar collector with copper coils and an insulated box, which is roughly the same collector design used today</p>	<p><b>1947</b> Because energy became scarce during WWII, passive solar buildings are in demand; Libby-Owens-Ford Glass Company publishes "Your Solar House"</p>	<p><b>1969</b> A "solar furnace" is constructed in Odeillo, France; it has an eight-story parabolic mirror</p>	
<p><b>6th Century</b> Justinian Code establishes "sun rights" to ensure all buildings have access to the sun</p>		<p><b>1839</b> French Scientist Edmond Becquerel discovers the photovoltaic effect</p>	<p><b>1891</b> Baltimore inventor Clarence Kemp patents the first commercial solar water heater</p>	<p><b>1921</b> Albert Einstein wins the Nobel Prize for his theories explaining the photoelectric effect</p>	<p><b>1958</b> A small PV array on the Vanguard I space satellite powers its radios. Silicon cells become the most widely accepted energy source for space applications</p> 

they upgrade the facilities in response to climate change. Two examples:

1. Wine makers, with enormous fixed infrastructures that are slow and expensive to change. Over a decade they may raise the money to do so, but for that decade they are exposed to the greater volatility of the weather and therefore potential loss of income due to crop damage.
2. Hydroelectric producers that built a multi-billion dollar facility, perhaps recently, perhaps 100 years ago, and that are utterly dependent on precipitation over which they have no control. In regions where precipitation is either becoming more uncertain or drought conditions are becoming more probable, resulting in no energy from snow or rain, XL Insurance provides coverage for economic losses associated with that lack of production.

**THE FUTURE**

As governments, federal and local, are increasingly mandating that certain percentages of energy are coming from such alternative resources, these resources will become a bigger and bigger element of our conservation and environmental citizenship efforts. The PV

industry, NREL researchers, and other Department of Energy laboratories are making significant progress in improving solar cell efficiencies.

And as reported in the March 3 *Chicago Tribune*, "Efforts by Northwestern University scientists (Tobin J. Marks, NU chemistry professor and his co-team research leader Robert Chang, a materials science professor) to boost the efficiency

---

**Weather risk – the occurrence of an observable weather event or variability in a measurable weather index – can impact the bottom line of utilities and other businesses, creating earnings volatility caused by changes in temperature and precipitation. Weather risk can cause losses either to profits (lost revenue and/or higher expenses) or property.**

---

of plastic-like flexible solar cells could make the technology commercially viable.

"Researchers have demonstrated a 40% efficiency increase in organic photovoltaic cells and believe that with further work they can raise that output significantly. Flexible solar panels could be manufactured cheaply causing technology similar to printing newspapers or the packaging used for potato chips... (making it eventually possible) to incorporate flexible organic PVs into roofing shingles... to generate electricity for the home.

"Many scientists contend that (PV) farms covering hundreds of square miles of American desert could generate the bulk of the nation's electrical power needs. The most recent proposal appeared in January's issue of *Scientific American*." The scale of the project seems daunting. But today's discussion and debate of such concepts illustrates the growing potential and acceptance for renewable resources. Scientific advances fueled by well-designed capital programs and encouraged with governmental support may well bring these projects and proposals closer to reality.





**1977**  
The US Energy Research and Development Administration launches the Solar Energy Research Institute (today's National Energy Laboratory)



**1992**  
Researchers at the U of South Florida develop a thin film PV cell with 15.9% efficiency

**2001**  
NASA's solar-powered aircraft Helios sets a new world altitude record for non-rocket powered aircraft: 96,862 ft., or over 18 miles up



**1970s**  
With the help of Exxon Corp., Dr. Elliot Berman designs a significantly less costly solar cell, bringing the price from \$100 per watt to \$20 per watt

**1981**  
Paul MacCready builds the first solar-powered aircraft – the Solar Challenger – and flies from France to England across the Channel



**2000**  
At the International Space Station, astronauts begin installing panels on what will be the largest solar array deployed in space

**And in the Future...**

All our buildings will feature energy-efficient design, construction and materials as well as renewable energy technologies.

The enormous solar power potential of the Southwest — comparable in scale to the hydropower resource of the Northwest — will be realized.

Within 10 years, photovoltaic power will be competitive in price with traditional sources of electricity.

**SOLAR HISTORY: A TIMELINE**

The use of solar energy was recorded as early as 7<sup>th</sup> Century B.C., when magnifying glasses were used to concentrate the sun's rays on a fuel and light a fire for light, warmth, and cooking. For an in-depth review of the history of man's use of solar power, refer to the following website: [www1.eere.energy.gov/solar/solar\\_timeline.html](http://www1.eere.energy.gov/solar/solar_timeline.html)

Source: (U.S. Dept. of Energy – "Solar History Timeline")

**MAJOR SOLAR ENERGY PROJECTS**

Examples of 21<sup>st</sup> Century major solar energy projects include:

- The U.S. Air Force, along with its joint partners MMA Renewable Ventures LLC, SunPower Corp. and Nevada Power Co. recently celebrated the completion of its PV system at Nellis Air Force Base. The 14 MW solar energy system will generate more than 30 million kWh of electricity annually.
- SunEdison has activated its 8.22 MW Alamosa, Colo., PV solar plant, the largest solar PV plant in the United States supporting substation loads for a major public utility, according to the company.
- In 2007, Acciona Energy North America formally dedicated its Nevada Solar One, a 64 MW concentrating solar energy power plant at Boulder City — the largest to be built in 16 years and the third largest of its kind in the world.
- In Spring 2002, the world's then fourth largest solar electric system began operating atop Satan Rita Jail in Dublin, Calif. It helps Alameda County reduce and stabilize energy costs. The jail's use of utility-generated electricity was reduced by 30%.
- In large commercial installations, such as 400-500 panel arrays in New Mexico, the electricity typically is sold back to grid-tied electrical systems.
- One of the nation's largest food and drug retailers is in the process of installing solar panels in their more than 1700 stores located in the United States and Canada. The panels will be owned, installed and operated by a vendor and then, through a power purchase agreement, the retailer will buy the resulting power it needs.