WEATHER DERIVATIVES – A NEW RISK MANAGEMENT SOLUTION FOR SOLAR POWER PLANTS

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Abstract

Beside the traditional risk management solutions, weather derivatives can now protect earnings from anticipated drops in demand. Predictability and stability of the cash flow are of crucial importance for public utilities and privately owned companies. Because weather hedging can stabilize earnings volatility, IPP's can use them to produce the stable and predictable results investors and commercial lenders appreciate.

Financial market innovation in recent years has been unusually fast and extensive. There has been a remarkable growth in the use of derivative instruments. These securities are side bets on exchange rates, interest rates, raw material prices, etc. . Firms do not issue these securities to earn money; they install derivative instruments to protect themselves against adverse changes in various external factors. It makes financial planing easier and reduces the odds of an embarassing cash shortfall

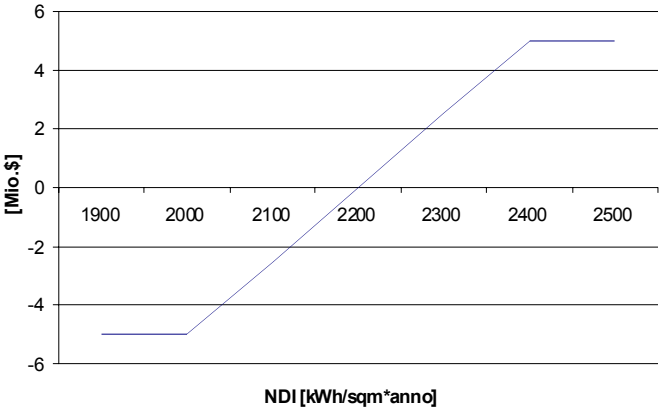

Figure 1: An example for a Swap Agreement

The most important hedging instruments are: Futures, Forwards, Options and Swaps. Traditional, the most widespread derivative instruments are Futures or Forwards against currency exchange risk and interest rate risk. Future contracts were originally designed for agricultural and similar commodities.

For most commercial solar power projects the solar radiation represents the most sensitive and the most unpredictable parameter for the determination of the financial feasibility and economic success of the project. For example, the owners of a commercial parabolic trough plant are interested in protecting its weather exposure and are therefore approaching a risk management company. The operating company knows that they cannot provide a sufficient return on investment to the equity investors if the yearly normal direct radiation (NDI) drops below 2200 kWh/m^2. They have to protect themselves against a year or a season with lower radiation than predicted. The risk management company will then look for a company who will profit from a "cold" year with lower insolation. For instance, a gas company could increase their revenues in a cold season due to a higher heating demand. The contract could then set a striking point; in our example the striking the 2200 kWh/m^2*anno. Drops the NDI below the striking point, the gas company has to compensate the solar power plant operating company. The power plant will now benefit from additional revenues and be able to compensate the losses associated with lower electricity sells. On the other side, the gas company can now comfortably settle the contract because the "cold" winter with many cloudy days fortified their income. Of course, if the yearly solar harvest turns out to be higher than expected, the solar power plant operating company has to compensate the gas company in the same way (see Figure 1). The above described contract, where the contract partners know directly each other and changes their obligation directly is called SWAP agreement. Both, the power plant operating company and the gas distributor have now less risk than before.

Another possibility for the parabolic trough facility to minimise the risk associated with variations of the solar radiation would be a "Put Option". The buyer of the put option would be compensated for every kWh insolation below the striking point. On the other side, there are "Call Option" existing that establish a minimum striking level and the buyer will be compensated for every kWH lower 2200 kWh/m^2*anno. Therefore the circumstances in which the put option will be valuable are just the opposite of those in which the call option will be valuable. Unlike the swap contract , the contract partners in an option contract are anonymous.