Risk management in the power market: seasonality, price spikes, mean-reversion and long-term predictions

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The production and distribution of energy, often in the form of electricity, is one of the key branches of economy in nearly every country in the world. The price of energy is important to companies, both large and small, as well as to individuals. Energy costs affect the competitiveness of a country and the standard of living of its citizens. Managing the volatility of energy prices is thus an issue of primary importance.

However, when dealing with the power market we have to bear in mind that electricity cannot simply be manufactured, transported and delivered at the press of a button. Electricity is non-storable (at least not economically), which causes demand and supply to be balanced on a knife-edge. Relatively small changes in load or generation can cause large changes in price and all in a matter of hours, if not minutes. In this respect there is no other market like it.

In the last two years there has been a severe loss of confidence in the entire business, especially in the United States. Rapid growth, inadequate credit and risk management controls, and most noticeably the breakdown of poorly designed California energy market and the Enron bankruptcy all contributed to this loss of confidence. Where does the gas and power trading business go from here? Did energy derivatives in any way contribute to the problems? Can the methods of statistical physics or stochastic processes be helpful in solving some of the problems? This paper attempts to answer these questions.