El valor CDD, se calcula de acuerdo con el numero de grados en promedio diario si la temperatura excede de 65 F.. Ejemplo: Un promedio diario de temperatura de 80 F. generaria un valor diario de CDD equivalente a 15, es decir, (80 – 65 = 15). Si la temperatura fuera inferior a 65, el valor de CDD seria cero. En teoria, no haria falta aire acondicionado.

El diferencial de grados termicos multiplicado por el factor indice aportaria la cantidad economica equivalente a la posicion asumida.

Este tipo de operaciones financieras tuvo sus inicios en el mercado over-the-counter en 1996 con una operacion estructurada por Aquila Energy con Consolidated Edison Co. Posteriormente, existio una actividad que evoluciono con lentitud, hasta que en 1999 Chicago Mercantile Exchange (CME) introdujo, por primera vez en la historia de los activos y derivados financieros, contratos de futuros y opciones climaticos, negociados en el Exchange y con liquidacion en el Clearing House.

Actualmente se negocian contratos sobre 18 ciudades de USA, sobre 9 ciudades de Europa, sobre 6 ciudades de Canada y sobre 2 ciudades de Japon. Mas recientemente, se negocian contratos sobre el riesgo de nevadas en Boston y New Cork y efectos de los huracanes en USA.

Los contratos negociables permiten tomar posiciones con caracter mensual o estacional, con sus correspondientes estrategias de «strip». Los indices actuales ofrecen mediciones sobre valores diarios y mensuales. Los futuros climaticos se negocian exclusivamente en CME Globex electronic trading platform, en tanto que las opciones sobre futuros son negociadas en el Floor del mercado, via open outcry.

Existen evidentes desafios en el uso efectivo y en la gestion de las opciones climaticas. Al respecto, existen modelos de valoracion de derivados climaticos de diversos niveles de sofisticacion en tanto que el simple modelo analitico muestra que no es necesaria la participacion de market makers.

Los contratos ofertados por CME han tenido un crecimiento exponencial, y a nivel indicativo, en Septiembre de 2005 asumian una negociacion de 630.000 contratos, con un valor nocional de 22.000 millones de USD.

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## VAR-TYPE MEASURES APPLICATION FOR RISK ANALYSIS OF A PROJECT IN THE ENERGY GENERATING SECTOR

The main objective of this study is to value and analyse the risk of a project in the energy sector. For valuation purposes, two different approaches are applied. First traditional (passive) NPV method is used and next, approach on the basis of real option is employed. Here it is supposed the most common type of real option – the possibility to shut down a production and restart it. Risk analysis relies on VaR-type measures – NPVaR and Expected shortfall. Results are compared and discussed.

Electricity generation and supply has been regarded for many years as a sector, which was best run as a monopoly and in most cases as a state-owned monopoly. If private utilities have been allowed, they were tightly regulated. Over the last ten years, this view of electricity markets has changed and in most countries the electricity supply industry has undergone

some reform. Restructuring the power sector is a very complex problem influenced by national energy strategies and policies, macroeconomic developments and national conditions. In Europe, all EU member countries have been gradually liberalising their electricity markets in accordance with the Directive for Unification of Electricity Markets.

Electricity market liberalisation process usually leads to the increase in uncertainty. Originally, under the monopoly situation, the only uncertainties were considered in fuel prices and electricity demand. After the liberalisation process, companies producing electricity face other market risks, particularly electricity prices and companies' competition. Moreover, both under monopoly situation and on liberalised markets, electricity suppliers face legal risks (legal environmental controlling, etc.).

This tendency is apparent not only in the Czech Republic, but other European countries as well. Moreover, transition economy process and economy restructuring are additional specific features of energy sector development. The changes have influenced the conditions of decision-making and several previous decisions had to be re-evaluated.

The main objective of this study is to value and analyse the risk of a project for electricity generation. For valuation purposes, two different approaches are applied. First traditional NPV method is used and then, approach on the basis of real option is employed. Here it is supposed the most common type of real option – the possibility to shut down a production and restart it. For the risk analysis, VaR-types measures are used. Analysis will be based on the results achieved by the both valuation approaches and results will be compared. In the end, sensitivity of selected risk measures will be analysed.

Due to the fact that some variables are difficult to predict exactly, simulation approach is applied (here for electricity prices and operational costs). To be the results reliable, 1000 simulations are made, which is supposed to be the minimum. Applied simulation models are transformed into discrete forms, where the length of one discrete time period is one year.

Standard techniques of investment appraisal at present are Net Present Value (NPV), Internal Rate of Return (IRR) and payback period, all of which can be accompanied by the sensitivity analysis. All these standard techniques rely on pre-defined scenario of cash inflows and outflows discounted by appropriate cost of capital reflecting time value of money and their risk.

Recently, modern investment theory has been proposed, which put aside some shortcomings and assumptions of traditional methods. The central argument of this theory is, that above mentioned methods (which assumes a single static decision) ignore management's flexibility to adapt and revise past decisions in response to the market developments. For this reason, these methods must be extended, to take into account the value of real options, assuming dynamic series of decisions and are in many projects involved. These options are valuable and create great part of total project value. Especially in the energy and other energy intensive industries, the value of real options is driven by many sources of uncertainty and that is why they are called rainbow options.

The basic advantage of real option methodology is that it takes advantages of analytical and numerical models of financial options valuing, i.e. there is no need to complicatedly calculate risk – adjusted cost of capital but only risk free rate is necessary to know and use.

CorporateMetrics is a tool for measuring market risk in the corporate environment. In broad terms, CorporateMetrics concentrates on two corporate financial results that affect, and that are commonly used to gauge acompany's value – earnings and cash flow. Specifically, CorporateMetrics enables companies to forecast earnings and cash flow for a range of different projected market rates – foreign exchange rates, interest rates, commodity prices, and output

prices. CorporateMetrics offers a VaR-type of methodology, the principles of which have long been widely used in portfolio risk analysis, where the exposure of financial instruments to market risk is routinely measured. Since VaR measures the maximum likely loss, it can be easily applied to corporate risk measurement.

The aim of this chapter is to calculate expected net present value by employing two different approaches: traditional (passive) and real option approach. Moreover, we make the risk analysis on the basis of selected risk measures on the basis of VaR-type measures.

The aim of this paper was to calculate the project value in the energy sector by applying two approaches and make the risk analysis by VaR-type measures. Project value is based on the application and comparison two approaches: traditional NPV and real option methodology. In the latter, option to temporarily shut down a production and restart was assumed.

Within risk analysis, first traditional statistical measures were calculated, again for both approaches. Next, NPVaR and Expected Shortfall criterions were calculated at 95 % confidence. Calculation of this risk measure is based on the principles of CorporateMetrics methodology. In the case of NPVaR, this measure quantifies the maximum possible loss at a given confidence level over a given horizon period. In the case of ES, the average loss at a given confidence level is estimated. In the end, sensitivity analysis of NPVaR and ES were calculated. Precisely, the changes in NPVaR and ES were calculated with the change in the confidence level.

It is apparent that when real option methodology is applied, i.e. possibilities of future actions are reflected in the valuation process, results are more favourable than in the case of traditional approach. These actions can increase the profitability of the projects or reduce possible looses. This is apparent from results stated in the Table 2 and Figures 7-9. Risk reduction is an important feature at the capital intensive projects, with high uncertainty about the future market evolution, which is typical for projects operated in electricity generating sector.

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## РЫНОК ПОТРЕБИТЕЛЯ

В современной экономике все больше растет осознание того, что удовлетворение и удержание потребителя это ключевые факторы успеха на рынке. Схемы удержания потребителей, разработанные многими организациями, ориентированными на рынок, наглядно демонстрируют выгоду, извлекаемую из долгосрочных отношений с потребителями. Задачей каждой организации, работающей на рынке, является превращение максимальной части удовлетворенных покупателей в повторных покупателей и максимальной части повторных покупателей в приверженных покупателей, которых трудно увести конкурентам.

Покупатель оказывается самым уязвимым звеном в механизме функционирования потребительского рынка. Сложившаяся ситуация на товарных рынках постсоветского пространства является в высшей степени иллюстративной для подобного утверждения. Анализируя причины этого, можно утверждать:

• Каждый из резидентов потребительского рынка имеет систему своих корпоративных, главным образом, экономических интересов. С этих позиций потребитель такой же равноправный участник, как торговля, производство и государство;