Even though contracts for the purchase and sale of natural gas providing an offtake flexibility concerning volume and time (gas sales agreements) have been commonplace in the natural gas industry for many years, the development of techniques for pricing them has not followed at the same pace. This thesis is motivated by the changing nature of the natural gas industry in the European Union, which is asking for a mark-to-market evaluation of these contracts. The flexibility provided by these contracts is then regarded as a financial option, called a “gas swing option”. Since the gas swing option is actually a set of several American puts on a spread between prices of two or more energy commodities, we devote one section of the text to the theory on spread option pricing. Due to the specific features of the energy markets the existing analytic approximations for spread option pricing are hardly applicable to our framework. That is why we employ numerical methods and model the spot price dynamics through stochastic processes capturing such features. The price of an arbitrarily chosen gas swing option is then computed in accordance with the concept of risk-neutral expectations, i.e. is considered as an expectation of discounted future cash flows for a probability structure called risk-neutral. Finally, our result is compared with the ex-post value of the option.