

# Christmas Workshop Energy Finance 2016 | December 12<sup>th</sup> – December 16<sup>th</sup> | Abstract

## Additive models for forward curves in multicommodity energy markets

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### Abstract:

In contrast to geometric models, additive models in energy markets, in particular in markets where forward contracts are delivered during a period like electricity and natural gas, allows easily the computation of forward prices in closed form. Moreover they naturally allow the presence of negative prices, which start to appear more and more frequently in electric markets.

In this talk we present an additive multicommodity model, based on the observed prices of forward contracts based on the mean on a period, which are the most liquid instruments in natural gas and electricity markets. Additive models have the great advantage, over geometric ones, that the sum of forward contracts has still the same kind of dynamics of the original processes. By using a Heath-Jarrow-Morton (HJM)-like theory, we build a model with mean reverting forward prices, which is consistent with no-arbitrage: this entails a condition on the coefficients of the model. We find out that the classical model of Lucia-Schwarz (2000) is a particular case of our model, and we extend this model to the case when a nontrivial term structure of the volatility, allowing for seasonality, is present. We also show how to estimate this model using time series of forward contracts found in the market.