Simple and Linear Bids in Multi-agent Daily Electricity Markets: A Preliminary Report

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Abstract. Variable generation (VG) has several unique characteristics compared to those of traditional thermal and hydro-power plants, notably significant fixed capital costs, but near-zero or zero variable production costs. Increasing the penetration of VG tend to reduce energy prices over time, increase the occurrence of zero or negatively priced periods, and reduce the cleared energy levels of existing plants. This paper presents an overview of an agent-based system, called MATREM, to simulate electricity markets. Special attention is devoted to a case study that aims at analyzing the behavior of a simulated day-ahead market in situations with increasing levels of wind generation, and also comparing market schedules and prices in situations involving either simple and linear bids.

Keywords: Electricity market; day-ahead market; simple and linear bids; wind power; MATREM system.

1 Introduction

Market forces drive currently the price of electricity and reduce the net cost through increased competition. Several market models have been considered to achieve the key objectives of ensuring a secure operation and facilitating an economical operation, notably electricity pools and bilateral transactions [1, 2]. A pool, or market exchange, involves basically a specific form of auction, where participants send bids to sell and buy electricity, for a certain period of time, to a market operator, that analyzes the bids and calculates a market price that must be followed by all participants—the market-clearing price.

Tailored long-term bilateral contracts are very flexible since the negotiating parties can specify their own contract terms, independent of the market operator. Such contracts consist essentially in direct negotiations of energy prices, quantities, time of delivery, duration, among other possible issues, between two parties. Market participants often enter into bilateral contracts to hedge against pool price volatility [3].