Electricity market simulator

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This report is based on a previous semestrial report entitled "Simulateur d'un marché de l'électricité (Electricity market simulator)". The initial objective of the report was to study electricity markets (Bilateral transactions markets and pool markets) in a context of electricity open market. In a pool market, all the producers operate at a same marginal cost. In bilateral transactions market, genetic algorithms optimise the power transactions, accordingly with the objective function.

In this previous report, a good objective function had not been found. And it did not permit to see a correlation between the two markets studied.

Actually the results were not exact. Consequently, in the first chapter, we begin by reporting the new results, showing the difference between the pool market and the bilateral transactions market. In this case the objective function allows the cheapest producers to work in the best conditions. We explain why the results are different. Finally we make use a power's discretisation. Consequently, both markets show exactly the same results. With the discretisation, some characteristics of the bilateral transactions market change.

The second chapter improves the programme, which simulate the incremental cost rate optimisation. Actually, some generators have a minimum capacity constraint. The lambda iteration method insures that the constraint is properly applied.

The long-term objective of my previous work, was to see the interactions between economical optimisation and technical constraints. In particular, the management of congestions. This report tries to reach another objective, which is to study the incentives aimed at gaming.

Gaming is examined in third chapter. First we see the benefits that gaming can generate, when the generator's costs are variable. Secondly, when they are constant. In a third part of the chapter, we will use real data relative to the England and Wales' Network. The generators are grouped in companies, and it changes the way to calculate and share the benefits. Finally we try to be more realistic to see what generators and companies can actually gain in the "real market".

In chapter four, we report briefly, the programmes used to realize the simulation.

We will terminate with a synthesis, which is composed by a recapitulation of the main results, a list of the future possible developments and finally a short conclusion.