

# ***MARKET MODELING FOR POWER GENERATION INVESTMENT ANALYSIS IN TURKEY***

**Bakatjan Sandalkhan<sup>†</sup>**

<sup>†</sup> Deloitte Consulting, Turkey

Armada İş Merkezi, A Blok Kat:7 No:8, 06510 Ankara, Turkey Tel: + 90 312 295 47 00.

E-mail: bsandalkhan@deloitte.com

## **1. Overview**

Investments in the electricity generation are very capital intensive with long lead times and payback periods. Decisions by private or state owned companies to invest on purely economic grounds are typically based on an expectation of sufficient cash flows based on the market price.

In traditional regulatory regimes, investment costs are passed through to customers directly so that investors would have guaranteed return on their investments. In a liberalized electricity market, electricity prices are the key driver of investment decisions for power generation.

Investment decisions for power generation are based on expected spot prices, i.e. forward/futures prices. In other words, economic and financial viability of investments are based not only on spot market prices, but also on the mid- and long-term expectations of price development. These expectations are market signals for making well-founded estimations of investment returns.

When there is enough reserve capacity, for example during off-peak period, prices of electricity in perfectly competitive markets reflect short-run marginal cost (SRMC). Market prices tend to rise above SRMC when reserve margins are low, for example during peak period, and in oligopolistic markets. In case of market prices rising above SRMC, generators are able to recover fixed costs and provide a return on investment. In the long run, average prices should be sufficient to sustain ongoing investment by covering fixed costs and providing a return on investment as well as covering variable costs.

Accordingly, it is crucial for an investor to make correct predictions in a highly volatile and uncertain market environment. Although there are many unknowns in terms of legislation, major economic incidents and future electricity price, solid market models could provide great benefit to market players. There are a number of models in the electricity sector which are capable of modeling for supply and demand, regulatory environment and market developments and provide invaluable insight to any interested party, not only to investors but also to financial institutions and private lenders.

This study provides an overview of different market modeling approaches for power generation investment and particular emphasis is given to applications in Turkish electricity market, which is one of the fastest growing electricity markets in the world and in transition to liberalized market structure.

## **2. Methods**

The methodology may be divided into three parts:

- (i) Literature review in relation to electricity market modeling, simulation and power generation investment as well as spot price forecasting is conducted.
- (ii) Peculiarities of Turkish electricity market and energy policy, regulation and economics are briefly summarized to define special need for market modeling of electricity markets that are in transition such as Turkey.
- (iii) Market modeling approaches and tools available in the market for its short and mid-term fittings to Turkish electricity market are evaluated to propose best fitted approaches and tools for decision making of investors, market players and new entrants for power generation investment in Turkey.

### 3. Results

Market modeling approaches and tools in electricity markets worldwide are evaluated. Since market development and maturity varies in each country, a particular approach best fitting to a mature market may not fit to a market in infancy. As a result, there is no “one size fits all” approach.

Best fitted approaches and decision making tools for investors, market players and new entrants for power generation investment in Turkey are proposed based on above methodology.

### 4. Conclusions

For investments in the electricity generation sector which is very capital intensive with long lead times and payback periods, decisions by private players or state owned companies to invest on purely economic grounds are typically based on an expectation of sufficient cash flows based on the market price. Market price forecasting can be conducted with market simulation and modeling. There are a number of models in the electricity sector which are capable of modeling for supply and demand, regulatory environment and market developments and provide invaluable insight to any interested party, not only investors but also financial institutions and private lenders. Since market development and maturity varies in each country, a particular approach best fitting to a mature market may not fit to a market in infancy.

Market modeling should reflect peculiarities of the market and best fitted approaches and tools for decision making are of most importance in power generation investment analyses.

### References

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**Bakatjan Sandalkhan** has a MSc in Civil Engineering and a MBA in corporate finance. He is a manager in Energy & Resources Group, Deloitte Consulting, Turkey, where he has been providing consulting services and research activities on energy economics, regulatory advisory, investment analysis, market simulation and analysis, generation planning and operation and trading and pricing in Turkey and abroad.