

# ***AN EQUILIBRIUM MODEL OF PRICE FORECASTING FOR THE TURKISH ELECTRICITY MARKET MODELING –“ENERGY EXPERT”***

**Cengiz Güneş<sup>†</sup>**

<sup>†</sup> Güneş Consulting

Yildizevler Mahellesi, 4. Cad. , 83. Sk., 13/8, Cankaya, Ankara, Turkey. Tel: +90 312 4410688.  
E-mail: botyid@botyid.com

## **1. Overview**

Deregulation has reshaped the electricity industry in worldwide. There are new challenges in the planning and assessment of future supply in terms of investment viability and system reliability. These new challenges came about due primarily to the added uncertainty in the energy price and the market factors that affect it. The process of long term forecasting must take these factors into account in order to provide a more accurate and realistic forecast of the electricity industry.

Price forecasting study point of view, equilibrium model is a practical approach yet robust enough to cover all necessary fundamentals and dynamics of the electricity market. EnergyExpert®, the model developed for forecasting electricity prices in Turkish electricity market for the coming years, is an equilibrium model.

The objective is to forecast electricity prices through modeling the whole power demand and supply in Turkish electricity market. The modeling is performed in line with existing conditions and current dynamics of Turkey (e.g. old state owned thermal power plants; the generation under must-take commitments from BOT/BO/TOOR (build-operate-transfer/build-operate/transfer-of-operation-rights) plants etc.).

The modeling approach also considers the expected developments and the possible operations of market players in the next 5-20 years.

## **2. Methods**

The structure of the Price Forecasting Model is as presented below:

The price forecasting model is mainly composed of;

- Demand and Supply Modeling
- Generation Optimization based on a Merit-Order Dispatching (minimum annual total system cost)
- System Marginal Cost (SMC) Calculation (SRMC-Short Run Marginal Cost)
- System Marginal Price (SMP) Calculation by Allocating Incremental Capacity Cost to ensure financial sustainability of the system (LRMC-Long Run Marginal Cost)

## **3. Results**

The model was used in several price forecasting projects that were done for a couple of private investors and banks. The work will present examples of particular case studies and applications.

## **4. Conclusions**

All investments need to be evaluated based on future price forecasts based on sound theoretical and practical ground reflecting current and future Turkish electricity market specifics, its unique regulatory, economic and technical characteristics. Turkish electricity market differs from other markets in respect of its regulatory environment, players, installed capacity and contracts. The price of electricity is calculated post-dispatch according to the pricing rules set forth in Turkish electricity market design. Electricity prices are driven by physical fundamentals such as demand forecasting, hydrological conditions, fuel prices and plant operating

characteristics. The work will present the EnergyExpert® model and its applications in Turkish Electricity Market.

## References

1. B. Sandalkhan “The Role of a Power Exchange for Energy Trading and Power Generation Investment” Proceedings of DEMSEE 2007 International Workshop on Deregulated Electricity Market Issues in South-Eastern Europe Conference, Istanbul, Turkey, 2007.
2. B. Sandalkhan and C. Gunes “Trading Arrangements in Electricity Markets“, CE-KA Yayinlari, December 2005, Ankara
3. C. Gunes “Electricity and Infrastructure Investment Models”, 2002, Ankara
4. Eurelectric, Ensuring Investments in a Liberalised Electricity Sector, 2004.
5. Ventosa, M., A. Baillo, A Ramos and M. Rivier (2005) Electricity market modeling trends. Energy Policy 33: 897–913

**Cengiz Gunes** has a MSc in Management Studies. He is a renowned expert and consultant in Turkish electricity market, founder and owner of Güneş Danışmanlık and Zirve Yönetim Danışmanlık Ltd. Şti. He is the designer and the owner of the EnergyExpert® model, a Turkish electricity market capacity and price forecasting model, based on his own expertise in Turkish electricity market and worldwide electricity modeling approaches. Gunes has published several books, reports, papers related to energy sector and sought-after speaker in energy conferences.