This problem is applied to different cases, where the impact on the profits of several factors, such as the price strategy, the discount on tariffs and the elasticity of customer demand functions, is studied.

05/02570 Placement of distributed generators and reclosers for distribution network security and reliability

Popovic, D. H. *et al. International Journal of Electrical Power & Energy Systems*, 2005, 27, (5–6), 398–408.

Electricity market restructuring, advances in energy generation technology and agreements on the reduction of global greenhouse gas emissions have paved the way for an increase in the use of distributed generation. This paper formulates and discusses a methodology for the optimal siting of distributed generators and reclosers that a security and reliability constrained distribution network can accept. Optimal siting is determined by sensitivity analysis of the power flow equations. The sizing method for a set of loading conditions, generation penetration level and power factor is formulated as a security constrained optimization problem. The information on optimal generation sites is used further to optimize system reliability assessed via reliability indices calculation. A genetic algorithm is designed to solve for optimal recloser positions when distributed generators are deployed in a securely optimal manner.

05/02571 Power flow and loss allocation for deregulated transmission systems

Teng, J.-H. *International Journal of Electrical Power & Energy Systems*, 2005, 27, (4), 327–333.

This paper proposes a systematic method to allocate the power flow and loss for deregulated transmission systems. The proposed method is developed based on the basic circuit theories, equivalent current injection and equivalent impedance. Four steps are used to trace the voltages, currents, power flows, and losses contributed by each generator sequentially. Using this method, the real and reactive power on each transmission lines and their sources and destinations can be calculated. The loss allocation of each line, which is produced by each generator, can also be obtained. Test results show that the proposed method can satisfy the power flow equation, the power balance equation and the basic circuit theories. Comparisons with previous methods are also provided to demonstrate the contributions of the proposed method.

05/02572 Power sector reforms in Brazil and its impacts on energy efficiency and research and development activities

Jannuzzi, G. D. M. *Energy Policy*, 2005, 33, (13), 1753–1762.

Since the mid-1990s Brazil has implemented significant changes in the country's power sector, including privatization, introduction of competition and the creation of regulatory agency. As reform started in Brazil traditional support to energy efficiency and energy research and development suffered a discontinuation, budget cuts and re-definition of roles of the public agents in charge. At the same time, new regulatory measures and the creation of a national public interest fund have helped to maintain and potentially enhance the country's effort to promote energy efficiency and investments in energy R&D. This paper analyses the impacts of these changes in the areas of energy efficiency and energy research and development and argues for an increased role of developing countries to provide solutions for a meeting energy demand requirements more suitable to their internal markets.

05/02573 Power source roadmaps using bibliometrics and database tomography

Kostoff, R. N. *et al. Energy*, 2005, 30, (5), 709–730.

Database Tomography (DT) is a textual database analysis system consisting of two major components: (1) algorithms for extracting multi-word phrase frequencies and phrase proximities (physical closeness of the multi-word technical phrases) from any type of large textual database, to augment (2) interpretative capabilities of the expert human analyst. DT was used to derive technical intelligence from a Power Sources database derived from the Science Citation Index. Phrase frequency analysis by the technical domain experts provided the pervasive technical themes of the Power Sources database, and the phrase proximity analysis provided the relationships among the pervasive technical themes. Bibliometric analysis of the Power Sources literature supplemented the DT results with author/journal/institution/country publication and citation data.

05/02574 Short term and medium term power distribution load forecasting by neural networks

Yalcinoz, T. and Eminoglu, U. *Energy Conversion and Management*, 2005, 46, (9–10), 1393–1405.

Load forecasting is an important subject for power distribution systems and has been studied from different points of view. In general, load forecasts should be performed over a broad spectrum of time intervals, which could be classified into short term, medium term and long term forecasts. Several research groups have proposed various techniques for either short term load forecasting or medium term load forecasting or long term load forecasting. This paper presents a neural network (NN) model for short term peak load forecasting, short term total load forecasting and medium term monthly load forecasting in power distribution systems. The NN is used to learn the relationships among past, current and future temperatures and loads. The neural network was trained to recognize the peak load of the day, total load of the day and monthly electricity consumption. The suitability of the proposed approach is illustrated through an application to real load shapes from the Turkish Electricity Distribution Corporation (TEDAS) in Nigde. The data represents the daily and monthly electricity consumption in Nigde, Turkey.

05/02575 Short- and long-run demand for energy in Mexico: a cointegration approach

Galindo, L. M. *Energy Policy*, 2005, 33, (9), 1179–1185.

The objective of this paper is to estimate the demands for the different types of energy consumption for the Mexican economy over the period 1965–2001. These demands are modelled as a function of output and the own real price. The Johansen procedure and the likelihood ratio tests indicate the existence of long-run and stable relationships between each type of energy demand and income with the exception of the industrial sector where the co-integrating vector also includes the relative prices. The weak exogeneity tests indicate that energy consumption and income do not reject the null hypothesis of weak exogeneity when relative prices are weak exogenous. The final econometric models show that relative prices in the short run are relevant in all cases, with the exception of the residential sector. These results indicate that in Mexico the demand for energy is fundamentally driven by income and that the effect of the relative prices is basically concentrated on the short run with the exception of the industrial sector, which also shows a long-term price impact. The strong dependence of energy consumption with respect to income and the price inelastic response indicates that it is necessary to introduce strong measures to decouple energy consumption from output in order to obtain sustainable economic growth in Mexico.

05/02576 Stochastic factor model for electricity spot price – the case of the Nordic market

Vehviläinen, I. *et al. Energy Economics*, 2005, 27, (2), 351–367.

This paper presents a stochastic factor based approach to mid-term modelling of spot prices in deregulated electricity markets. The fundamentals affecting the spot price are modelled independently and a market equilibrium model combines them to form spot price. Main advantage of the model is the transparency of the generated prices because each underlying factor and the dynamics between factors can be modelled and studied in detail. Paper shows realistic numerical examples on the forerunner Scandinavian electricity market. The model is used to price an exotic electricity derivative.

05/02577 Support vector machines with simulated annealing algorithms in electricity load forecasting

Pai, P.-F. and Hong, W.-C. *Energy Conversion and Management*, 2005, 46, (17), 2669–2688.

Accurate forecasting of electricity load has been one of the most important issues in the electricity industry. Recently, along with power system privatization and deregulation, accurate forecast of electricity load has received increasing attention. Because of the general non-linear mapping capabilities of forecasting, artificial neural networks have played a crucial role in forecasting electricity load. Support vector machines (SVMs) have been successfully employed to solve non-linear regression and time series problems. However, SVMs have rarely been applied to forecast electricity load. This investigation elucidates the feasibility of using SVMs to forecast electricity load. Moreover, simulated annealing (SA) algorithms were employed to choose the parameters of a SVM model. Subsequently, examples of electricity load data from Taiwan were used to illustrate the proposed SVMSA (support vector machines with simulated annealing) model. The empirical results reveal that the proposed model outperforms the other two models, namely the autoregressive integrated moving average (ARIMA) model and the general regression neural networks (GRNN) model. Consequently, the SVMSA model provides a promising alternative for forecasting electricity load.

05/02578 The first step in restructuring the US electric industry

Barnett, A. H. *et al. Energy Economics*, 2005, 27, (2), 225–235.

The electric industry lobbied for its first step in restructuring, from local franchises to regulated state monopolies during the early 1900s. The present paper examines this restructuring with an empirical model that includes the introduction of natural gas and steam turbine generators. The restructuring resulted in fewer firms, higher costs, and higher prices, consistent with increased monopoly power and captured regulators.