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EDITORIAL

Foreword

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The onset of deregulation in the power sector has brought to the fore several pronounced issues related to reliability assurance. In order to better appreciate the sea-changes brought forward by deregulation, identification of areas of evolving reliability research in the regulated regime also goes a long way in dealing with their deregulated counterparts. Significant in these studies is the incorporation of stochastic effects, necessitating the extensive usage of probabilistic methods and joint deterministic-probabilistic methods.

Critical works on new tools, models, techniques, applications and surveys related to various aspects of power system adequacy, security and risk assessment, both in the regulated and deregulated spheres, are covered in this special issue. More specifically, papers included cover the issues as outlined below:

Paper 1 proposes quantitative risk and reliability assessment methods as tools to meet the new incentives of well performed asset management in the operation and planning of electrical distribution systems.

Paper 2 provides an overview of CAISO study results for planning reserve margin (PRM) under various load and resource scenarios, increase in generators' forced outage rate, and impacts due to California's environmental policies regarding electric supply sector, such as its once-through cooling (OTC) draft policy and Renewable Portfolio Standards (RPS) targets.

Paper 3 discusses how reliability indices can be fully used through performance-based mechanisms to establish contracts that reward a utility for providing good reliability and/or penalize it for poor services in electric power distribution systems. The concept of performance based rates is extended to cope with tariffs and possible insurances based on differentiated reliability performance.

Paper 4 uses a tandem combination of deterministic and probabilistic load flow studies in conjunction with power flow tracing procedures, to propose a step-by-step procedure to arrive at a novel transmission pricing methodology, which effectively captures the impact of both aleatory and epistemic uncertainties in composite power systems.

Paper 5 illustrates how the wind data at a particular site can be utilized to create wind power models and applied in generating capacity adequacy assessment. The reliability impacts of energy storage, wind dependence on multiple wind farms, wind capacity credit and the replacement of conventional generation by wind power are illustrated on standard reliability test systems.

Paper 6 compares two alternative probabilistic techniques for the adequacy assessment of small isolated wind/diesel systems, namely analytical convolution method and sequential Monte Carlo simulation.

In Paper 7, common-cause failures (CCF) are investigated in the reliability evaluation of composite power systems when the effects of hurricanes are considered. A method based on Bayesian networks (BN) is put forward to solve this problem.

Paper 8 investigates key factors that affect the predicted effective load carrying capability (ELCC) such as the system generating capacity composition, load pattern,

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generating unit parameters, desired system reliability level, system size, wind conditions at a site and the wind penetration level as well as its wind speed correlation.

Paper 9 presents a presents the results of a recent customer survey conducted in a developing country (Nepal) to estimate the costs associated with various types of power outages. This is with the intent of obtaining a good estimate of the cost of unserved energy in order to determine the appropriate level of investment in the system facilities during system planning.

Paper 10 describes an integrated approach for security of electricity supply analysis, by the integration of power system reliability analysis with the power market analysis, which will enable the long-term security of supply assessment and provide a more consistent input to the various analyses, as well as a better information exchange and interaction between the different methods and tools involved.

Paper 11 presents a load forecast methodology using the Bayesian Belief Network (BBN) that is suitable for power system operational planning studies involving uncertainties.

In keeping with the goals of IJSAEM in providing a platform for the modeling and analysis of large engineering systems, among the other allied goals of systems assurance engineering, leading to the enforcement of system performance enhancement measures, we are glad to bring out this timely special issue on "Critical Challenges and Practices for Reliability Assurance of Power Systems".