

SPECIAL ISSUE

SMART GRID: THE ELECTRIC ENERGY SYSTEM OF THE FUTURE

Edited by H. Gharavi and R. Ghafurian

- 922 Challenges and Opportunities in Smart Grid: A Position Article**
By G. W. Arnold
 | INVITED PAPER | This introductory article gives an overview of the concepts and purpose of the Smart Grid and the important role of communications technology in its development.
- 928 Smart Generation and Transmission With Coherent, Real-Time Data**
By D. E. Bakken, A. Bose, C. H. Hauser, D. E. Whitehead, and G. C. Zweigle
 | INVITED PAPER | The bulk power system and power applications for wide area measurement are discussed in this paper and a set of baseline requirements for data delivery systems is derived.
- 952 A Multilevel State Estimation Paradigm for Smart Grids**
By A. Gómez-Expósito, A. Abur, A. de la Villa Jaén, and C. Gómez-Quiles
 | CONTRIBUTED PAPER | The authors of this paper describe a multilevel state estimator architecture that can sustain growth in size, complexity of data, and information.
- 977 Translational Knowledge: From Collecting Data to Making Decisions in a Smart Grid**
By M. Kezunovic
 | INVITED PAPER | Converting data to knowledge is the main concern of this paper, which provides a new data processing solution and illustrates it through several applications.
- 998 For the Grid and Through the Grid: The Role of Power Line Communications in the Smart Grid**
By S. Galli, A. Scaglione, and Z. Wang
 | INVITED PAPER | The role of power line communications in the Smart Grid is addressed in this paper, which presents a review of what these communications can offer.
- 1028 Multigate Communication Network for Smart Grid**
By H. Gharavi and B. Hu
 | INVITED PAPER | Wireless mesh networking is the main concern of this paper, which describes techniques to enhance network performance in terms of reliability, latency and throughput.
- 1046 High-Assurance Smart Grid: A Three-Part Model for Smart Grid Control Systems**
By T. M. Overman, R. W. Sackman, T. L. Davis, and B. S. Cohen
 | INVITED PAPER | Cyber security and control for future Smart Grid systems is the topic of this paper, which recommends distributed control for grid management and hierarchical control for planning and dispatch.

DEPARTMENTS

- 915 POINT OF VIEW**
 Avoiding “Bit Rot”:
 Long-Term Preservation
 of Digital Information
By V. G. Cerf
- 917 SCANNING THE ISSUE**
 Smart Grid: The
 Electric Energy System
 of the Future
*By H. Gharavi
 and R. Ghafurian*
- 1145 SCANNING OUR PAST**
 On Behalf of the Message
By H. V. Kampen
- 1151 FUTURE SPECIAL ISSUES/SPECIAL SECTIONS**



On the Cover: This month we explore the Smart Grid: The Electric Energy System of the Future, and our cover is an unusual photograph of a partially illuminated power plant at night.

[Continued on page 914 ►]

SPECIAL ISSUE: Smart Grid: The Electric Energy System of the Future

1063 Options for Control of Reactive Power by Distributed Photovoltaic Generators

By K. Turitsyn, P. Šulc, S. Backhaus, and M. Chertkov

| CONTRIBUTED PAPER | This paper presents challenges and opportunities for distribution utilities, simulates options for managing reactive power, and discusses benefits of choosing local variables to control the system.

1074 Smart Distribution: Coupled Microgrids

By R. H. Lasseter

| INVITED PAPER | The author of this paper believes that use of microgrids can simplify implementation of many Smart Grid functions, including reliability, self-healing, and load control.

1083 Advances in Wind Energy Technologies in the Context of Smart Grid

By M. Glinkowski, J. Hou, and G. Rackliffe

| INVITED PAPER | Interconnection of large wind farms with the power grid can add a new degree of control to the power system, according to the authors of this paper.

1098 Adaptive Stochastic Control for the Smart Grid

By R. N. Anderson, A. Boulanger, W. B. Powell, and W. Scott

| CONTRIBUTED PAPER | The main theme of this paper is that creation of the Smart Grid will provide self-healing capabilities and improved efficiency and allow load and source management for better performance.

1116 Vehicle Electrification: Status and Issues

By A. G. Boulanger, A. C. Chu, S. Maxx, and D. L. Waltz

| INVITED PAPER | Current development and the challenges and opportunities for global adoption of electric vehicles are explored in this paper; these vehicles are said to empower people to effect change.

1139 The Role of Energy Storage in Development of Smart Grids

By B. P. Roberts and C. Sandberg

| INVITED PAPER | Energy storage aspects of the Smart Grid are discussed in this article; various storage technologies are reviewed and the importance of storage systems in electric grid operation is described.

Proceedings OF THE IEEE

On the Web

www.ieee.org/proceedings

Find the following information on our website.

[How to Subscribe](#)

[Journal Description](#)

[History](#)

[Current Issue](#)

[Special Issue Schedule](#)

[Recent Highlights](#)

[The Publication Process](#)

[Information for Authors](#)

[Reader Opinions and Suggestions](#)



On the Web

www.ieee.org

MEMBERSHIP

Check out the many features available through the IEEE Membership Portal.

PUBLICATIONS

Find IEEE articles by using the search features of IEEE Xplore

SERVICES

The IEEE offers many services to Members, as well as other groups.

STANDARDS

The IEEE is the leader in the development of many industry standards.

CONFERENCES

Search for the ideal IEEE Conference, on the subject of your choice

CAREERS/JOBS

Find your next job through this IEEE service.