

# Guest Editorial

## Special Section on Applications of Solar Energy to Power Systems

**A** SPECIAL Section in this issue of IEEE TRANSACTIONS ON SUSTAINABLE ENERGY (TSTE) is devoted to Solar Energy. I would like to thank the prior Editor-in-Chief of TSTE, Prof. Saifur Rahman, for the opportunity to develop this Special Section and for his guidance on creating a successful issue.

Currently solar energy only makes up a small fraction of the total energy to meet the world demand. But due to rapid decreases in solar energy prices, solar energy has made significant strides to becoming an important player in creating a sustainable energy future. Both concentrating solar power (CSP) and photovoltaic (PV) system prices have dropped significantly. As of 2012, more than 100 GW of solar have been installed worldwide. An emerging challenge to achieving larger market potential is the ability of the electricity grid to handle high penetration levels of distributed and centralized solar energy technologies. The concerns of utilities focus largely on technical issues surrounding grid planning, operations, reliability, and safety. This section of TSTE highlights some of the most recent research that addresses these integration challenges and presents novel solutions for the integration of solar energy into the electric power system.

The Special Section in this issue contains nine papers that were selected from the forty-one papers submitted. Four of the

papers in this section examine the fact that solar energy is variable in nature and could benefit from integration with energy storage. By using energy storage, solar energy can be stored during periods of high output and then used when needed. Another important aspect of integrating solar energy is the ability to forecast its power output and there are four papers that examine the latest techniques in solar forecasting. A final paper focuses on understanding the impacts of high penetrations of solar on distribution systems and development of solutions to mitigate these issues.

I would like to recognize the service of my coeditors for this issue: Martin Braun from the University of Stuttgart and Fraunhofer IWES, Abraham Ellis from Sandia National Laboratories, Jan Kleissl from the University of California, San Diego, Mark Mehos from the National Renewable Energy Laboratory, and Colin Schauder from Satcon.

I would also like to thank Randi Scholnick and the new TSTE Editor-in-Chief Bikash Pal for supporting us to bring this Special Section to fruition. We hope that you find this Special Section useful and can serve as a reference for future work in the field of solar energy integration.

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