DESIGN OF SMART POWER GRID RENEWABLE ENERGY SYSTEMS

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I dedicate this book to my father,
Dr. Mohammed Hossein Keyhani
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**FOREWORD**

**PREFACE**

**ACKNOWLEDGMENTS**

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It is an honor for me to add my comments to a very important book by Professor Ali Keyhani, *Design of Smart Grid Renewable Energy Systems*.

The restructuring of the electric power industry was a critical step for individual stakeholders, facilitating their wide participation in the production, delivery, and utilization of energy. The “smart grid” has further offered alternatives to participants looking to enhance the reliability, sustainability, and capability for customer choices in energy systems. The smart grid has made it possible to set up microgrids that could be operated as stand-alone islands in critical operating conditions. Such small installations can enhance the reliability of regional electric power systems when the larger grid is faced with major contingencies. There are several practical examples of microgrid installations which have demonstrated that the use of smart switches in distributed power grids could reduce the number and the duration of outages.

In addition, the smart grid allows microgrids to optimize the use of volatile and intermittent renewable energy resources and enhance the sustainability of regional power systems. The applications of solar photovoltaics, which mostly follow the daily load profile for power generation, on-site or local wind energy, along with storage devices for microgrid installations could provide an inexpensive and sustainable means of supplying microgrid loads. The principles of widespread utilization of energy storage can also be found in the emerging market of plug-in electric vehicles, which would utilize wind energy at off-peak hours. Such microgrid applications could also eliminate the need for extensive additions of high voltage lines for the transmission of renewable energy across densely populated regions of the world.

However, the evolutions in the electric power industry that I believe will truly revolutionize the way we deliver electricity to individual consumers are