

Preface

Energy has moved to the forefront in societal and economic development. Wise economic decisions are needed for the questions of the use of non-renewable and renewable energy sources, pollution and global warming. Our homes and real estate are all the time more and more dependent on electricity. Electricity bills take a growing share of the budgets of households and firms, and this development creates new needs for smart usage of electricity.

Electricity industries have been among the first for deregulation and liberalization and room has been given for market mechanisms. We are currently in the situation to critically evaluate this development. Technology constraints for the use of efficient market mechanism are vanishing and this enables the use of new models such as incentive oriented real-time pricing.

While generation has been deregulated transmission and distribution are still, because of their natural monopoly, being regulated. New economic theory based, incentive driven regulation mechanisms have, however, been developed and practically applicable versions already exist. We are currently beginning to see significant structural changes also in power network systems. This change relates to intelligent networks or smart grids as they are also called. The basic element that relates to intelligent networks is that they change the one way traffic still going on in dumb networks to a two way dynamic system. The future smart grids allow the role of consumers to change from passive out takers to active users and optimizers of their extended energy possibilities. This creates new challenges and possibilities for the whole chain of the power system.

There is a strong and growing need to understand the energy market in a comprehensive manner. This means that all parts of the whole power system chain must be analyzed at the same time. The flow of electricity from generation through transmission and distribution to the final consumer, and the roles of all the players in this market, form an interesting entirety for economic analysis. The main motivation of this book is to give a comprehensive economically oriented picture to this extremely interesting and central field of modern societies.

We hope that this book is good reading for economics and engineering students as well as researchers interested in environmental and energy issues. The book also covers timely and relevant issues related to societal and economic decision making and thus is good reading also for officials and decision makers in environment and energy related fields.

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