

Foreword

The population on Earth grows steadily, putting forward various new problems and challenges. One of these problems consists in providing a steadily growing population with food and other vital goods. *Decision making* on this problem addresses new lands and territories, especially on the rural countryside, which should be suitable for economic activities required by organizations. Nowadays, there is a situation where in one territory an over-population is given while other territories are empty and are not yet used for the creation of goods needed for human life. Such territories are available not only in countries that have vast areas, but also in countries which have small territories where next to overpopulated zones there are deserted, sparsely populated regions.

Empty, deserted territories are not accessed by the majority and their needs because they are removed from the centralized sources of power supply, and independent power supply is complicated due to high cost of technologies and equipment used for these purposes. At the same time, in recent years the ideal of a distributed, socially-oriented economy has spread significantly. This has given a ground to assume that a distributed placing of capacities, of habitation and of resources (including human) in the nearest future will essentially change our views and approaches to the development of territories, to existing financial, educational, technological and communication systems, their ethical and “spiritual” reference points, connotations, and decision-making systems and frames.

Modelling and solution of this global problem requires the creation of technological and organizational preconditions. Our contemporary level in science and technology permits to offer new techniques and equipment for necessary power supply of such territories and perspectives of electro-technologies for transportation of electric power and its effective utilization. That use will enable manufacturing of agricultural products and maintenance of a comfortable residing of the people.

However, very often such underlying information is not accessible to heads of local authorities, businessmen and the population; therefore, it has remained unused. This book aims to provide relevant information, a representation of wide publicly advanced achievements in the fields of electro-technologies, efficient use of electric resources and renewable energy sources. This should be useful to a wide range of readers and, as we hope, exercise a positive impact on the solution of sustainable development problems of new territories. This book has been open to cover all problem complexities in the decision making on the formation of a distributed economy and the development of new territories as a core element of this problem.

In this compendium, innovative technologies which provide an effective production, transfer and use of electric energy, whose use can allow for a successful development of new territories for realization of the concept of the distributed economy, have been described. A particular interest has been given by

Foreword

the fact that a considerable part of the material presented in the book was unpublished so far in Anglo-Saxon literature and, consequently, it was hardly available to a wide range of interested readers in many countries worldwide.

The target readership of this work was composed of both professionals and researchers who are working in the emerging area of Energy Efficiency, Energy Saving Technologies, RES-based Energy Supplied Systems and different kinds Renewable Technologies. Furthermore, this book aims to ensure insights and foster executives who are serving for the development of agricultural and industrial companies and projects on new territories and for sustainable development of these territories.

The subjects of this book's chapter were open, but not limited to:

- Solar thermal energy installations,
- PV solar,
- Wind-based energy generation installations and systems,
- Small hydropower plants,
- Specific i RES potential estimation methodologies in condition of meteo data absence,
- Cogeneration PV-Thermal modules fabrication and application,
- RES application best practices,
- RES potential in different countries and remote territories,
- Diagnostic and monitoring methods for energy equipment status,
- Providing parameters of solar power plant with given generation graph,
- Innovative 10–110 kV compact controlled overhead lines,
- Resonant Electric Power Systems for Renewables-based Electric Grids,
- Resonant system of electricity transfer of high power,
- Energy saving system for illumination of greenhouse plants,
- Energy efficient electric equipment for heat supply in Agriculture,
- Electric pulse cultivation,
- Pre-sowing Seed Treatment in a Magnetic Field,
- Use of Microwave Energy at Thermal Treatment of Grain Crops,
- Scientific and methodological support of electric system operation,
- Biological Objects Reactions Management,
- Solutions for diesel, wind and solar power plants joint use for autonomous power supply.

We would like to underline the great importance of this book project for everyone involved into it so far and to all its forthcoming readers. In fact, we trust that in future optimization and optimal control will further be in the center of support to the decision-making aid and support which this book aims at. In this context, we particularly mention stochastic optimal control under regime switches of economic and cultural kinds. Here we and our colleagues are working on scientifically, for further inclusion of real-world situations and scenarios, with all their Uncertainties and with the Human Factor, into the needed optimal decision making.

To all the authors of this valuable book, we convey our appreciation and gratitude for having shared their expertise and devotion with the academic community and with humankind. Furthermore, we extend our gratitude to the two editors of this compendium, Prof. Dr. Valeriy Kharchenko and Prof. Dr. Pandian Vasant, for their hard work and vision, of having collected a remarkable variety of rich contributions.

Eventually, we are very grateful to the publishing house of IGI Global, for ensuring and making become reality a premium book of real-world significance and of a high potential impact for tomorrow's world, for the present and the following generations.

Now, we wish us all a lot of pleasure and gain when reading this interesting work, and we hope that a remarkable benefit will be received from it both personally and societally.

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Emel Savku is an advanced junior researcher of Middle East Technical University (METU), Ankara, Turkey, researching at Institute of Applied Mathematics. She is working on a Markov regime-switching jump-diffusion model to develop new results by the tools of Stochastic Optimal Control. Since she is studying under the discipline of Financial Mathematics, in her research she presents several applications in finance and economics. Her PhD. thesis is called "Advances in Optimal Control of Markov Regime-Switching Models with Applications in Finance and Economics". Core results of her research will appear in "Journal of Optimization Theory and Applications" (JOTA). During her PhD. studies, she served as a research assistant at Department of Mathematics, METU.

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