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Challenges and Solutions in the Russian Energy Sector

 Springer

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Preface

This book was prepared through close cooperation between university researchers and practitioners. It is dedicated to the better understanding of the complex problems associated with the role of energy in today's world.

Energy ensures the functioning of almost all elements of modern society from large industrial and transport systems to computer devices and households.

It is a well-known rule that lower energy production in a country correlates to lower GDP (gross domestic product) and standards of living. Energy consumption in the world is also unevenly distributed. One billion persons consume 80% of energy, and the remaining 6 billion – only 20%. The available power in different countries differs by more than 50 times.

Modern economies can be supported only by countries which have managed to ensure abundant energy supplies. Economic growth is achieved through the development of the power industry.

The constant increase in population, the lack of energy resources and their uneven distribution, their impact on the environment, globalization and other factors are critical to achieving energy sustainability.

Judging by diverse forecasts, global energy consumption could double by mid-century. Growing tensions in the market of fossil fuels make it difficult to resolve this problem by increasing the use of traditional energy resources. The solution will require the use of nuclear energy and renewables. At the same time, there will be changes in the consumption of energy resources related to scientific and technical progress and to innovations in the world economy.

One of the major problems of modern society is to ensure free access of countries, businesses and individuals to energy and energy services. Considering the importance of the problem, the United Nations has put forward a global initiative in the form of the “Sustainable Energy for All”. To implement it, a network of knowledge “The UN-Energy” and financing mechanisms of energy efficiency and renewable energy development have been created. Powerful intellectual capital, enormous material and financial resources are to be mobilized.

For cold-climate countries, the situation is exacerbated by the need to spend a significant portion of their energy for heating. For example, in Russia, the most urgent need for accelerated modernization of the energy sector is in the social and housing sector, which consumes about 80% of the country's power.

Problems of development of the energy sector in countries with transition economies relate to the increase in the ageing of the main equipment; insufficient levels of investment in the energy sector and their inefficient use; the absence of mechanisms to stimulate attraction of investments; lack of innovation in power engineering and electrical industries; large excessive losses of energy, especially in the heat supply systems; and ineffective tariff policy, low energy efficiency and irrational use of energy resources.

In the developed countries, the priority is to replace a significant part of the traditional non-renewable energy resources by new sources of energy, which requires joint efforts of scientists and the necessary financial resources.

Complex challenges associated with the acceleration of traditional energy consumption and associated pollution require an interdisciplinary approach to solve them. The approach ought to aim to cover all aspects, that is, innovative technologies to ensure energy efficiency and environmental safety of stationary and mobile power generating units and transport modes using hydrocarbons; introduction of alternative fuels and energy, and energy efficient technological processes. It is also necessary to take into account the social and political consequences of these tasks by implementing effective management systems based on the knowledge of engineering, economic and environmental factors. Extremely important is the education for managers providing them with the methodology to operate in an environment of accelerating changes, instability and high risks.

The chapters of this book attempt to discuss some of those problems and provide some guidelines regarding the future direction and new areas of research.

The editors would like to express their gratitude to all the authors for their contribution, and to the Editorial Board and other scientists who reviewed the material in each chapter and thus ensure the quality of this book.

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