Foreword

Energy is one of the most important basic inputs of economical and industrial development. Nowadays there is an ever increasing concern and interest in important issues like sustainable development, rational use of energy, effective use of renewable energy sources, successful energy planning, energy efficiency, optimization of energy consumption, environmental protection. Since the late 1990s, the European Commission (EC), as well as other international donors (World Bank, Asian Development Bank), has become increasingly active in the areas of sustainable energy and ICT in order to address the challenge of fighting climate changes.

The EC – in its proposal dated June 2005 for a Specific Community Research Programme during the period 2007-2013 – has identified ICT as a major field of progress in terms of research and knowledge addressing and supporting social, economic, environmental and industrial challenges and contributing to sustainable development. Recently, in May 2008 the EC adopted the Communication *"Addressing the Challenge of Energy Efficiency Through Information and Communication Technologies"* which focuses on ICT as an enabler to improve energy efficiency across the economy and the whole of society. Indeed, energy efficiency as a whole is a key challenge in our future world, leading to a twofold bet, both energetic and environmental and ICT can play an important role in this area.

Energy consumption is a key issue nowadays. In Europe, for instance, between 40% and 50% of the energy we generate goes into heating and powering our buildings, homes account for around 30% of the carbon emissions. There is no doubt that a significant reduction of energy consumption is possible with the development and application of new and intelligent ICT-based products to be used in new and existing houses as well as in public buildings such as schools, hospitals, governmental buildings. Renewable energy can play a strong role in contributing to energy provision, not only as a choice for consumers but also to contribute indigenous, non-fossil energy resources into the market.

For this reason, Governments and nongovernmental organizations, including development agencies and businesses are increasingly concerned with the elaboration of a shared vision and roadmap towards ICT-based innovation and intelligent solutions in the energy sector. Decision support systems, intelligent information systems, agent technologies, artificial intelligence-based technologies, knowledge management can heavily contribute to sustainable development and environmental protection, while maintaining growth.

It is then of considerable importance that we not only better understand the processes underlying the innovation and adoption of new technologies – especially ICT – and the broader processes of creativity generating knowledge-based activities, but also that we know more about the resultant outcomes, both economically and socially. In this context, a publication on intelligent information systems and knowledge management in the energy sector deserves primary importance among the academia, researchers, development practitioners, policy initiators and individuals.

This book, edited by Kostas Metaxiotis, represents an ambitious attempt to address the multiple issues concerning how ICT and intelligent information systems can be used with the aim at solving the above

presented key issues in the energy sector. The book brings a diverse set of perspectives and provides a rich set of tools, systems, applications and case studies in the energy sector.

Importantly the book provides concepts, approaches, applications and case studies from both developed and developing nations. Some of the 16 chapters focus attention on innovative concepts and theories. Other chapters include descriptions of advanced systems and applications in fields such as energy generation, energy efficiency, energy consumption, renewable energy, poly-generation planning, energy security risk assessment, power system planning and operation, knowledge management in electric power utility companies.

It is a welcome contribution to the growing literature on how to use and apply ICT in the energy sector. The major asset of this book is the accumulation of several theoretical researches, case analysis, and practical implementation processes accompanying profound discussions and techniques for accomplishing tasks that one could easily adopt even in a non-technical environment. In fact, this book will act, not only as a research guide but also as an implementation guide in the longer run.

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