Beginning with the second half of the twentieth century, serious and well-substantiated concerns were formulated considering humanity development, as accelerated economic progress was the main focus without considering the medium- and long-term effects on the environment and on the natural resources. The economy progress supported the population increase, raising the demand for new resources, for food, for working places, supporting further technological progress. This spiral, launched by the Industrial Revolution in the nineteenth century could function as long as the Earth’s resources were in large amounts and the environmental quality was not endangered.

Development scenarios firstly formulated in the ’70s, and further refined and updated, outline that accelerated consumption depletes raw materials, but mainly shows that nature is no longer able to balance the resources and to mitigate the effect of end-products; pollution became thus one of the major threats affecting humanity.

Energy is the key to economic development; for over 150 years, fossil fuels (coal, oil, gas) represented the main raw materials in thermal and electric energy production, releasing large amounts of wastes; among these, greenhouse gases (GHG) were found responsible for severe consequences that are now at the border of irreversibility: climate change and global heating. Thus, concerted actions are required to mitigate GHG and their effects, by following two major paths: increasing the efficient use of traditional energy fuels (thus getting more output for the same input), but mainly by replacing fossil fuels with inexhaustible sources—renewable energies.

New concepts are therefore expected to be found, designed, and implemented in all areas where energy is used: industry, agriculture, transportation, etc.

A significant part of energy is used in the built environment for covering thermal and electric needs; additionally, other common utilities (particularly water and wastes) require energy for being produced, delivered, or disposed. This makes the built environment one of the most important components that need to be specifically addressed and changed in the future sustainable energy model.
The development of a sustainable built environment requires reductions in energy consumption (by cutting the losses and implementing energy efficient consumers), for reaching the \textit{Low Energy Building} status. By implementing renewable energy systems, the much lower energy demand could be totally or partially met based on sustainable, non-polluting systems in the \textit{Nearly Zero Energy Buildings} (nZEB). Conceptually, this stepwise development is logical but its implementation needs novel solutions for making buildings not only efficient and green but also affordable. To speed up this process, a legal frame was proposed and will be implemented by 2018 all over EU, requiring for all public buildings to meet the nZEB standards, and by 2020 imposing the same thresholds for each new building. Therefore intensive research is under development all over the world, for developing novel concepts, equipment, systems to be implemented in the built environment. For reaching a feasible output, an interdisciplinary approach is required to develop optimized energy mixes, considering the available on-site renewable energy resources and able to meet the energy demand in the building.

Sensing this need, the R&D Centre Renewable Energy Systems and Recycling (RES-REC) in the Transilvania University of Braşov, activated in the past 10 years for developing complex interdisciplinary systems for promoting advanced concepts, products, and processes supporting the implementation of sustainable energy solutions from “material to prototype”. In the past years, special focus was set on finding novel, feasible, and acceptable solutions for the built environment. Many of these are now implemented, monitored, and optimized in the R&D Institute of the university, designed as a sustainable community and opened in 2013.

As an instrument to support the R&D international effort, the RES-REC center launched in 2005 the Conference for Sustainable Energy, CSE. A trend was set for each edition by proposing subjects of high interest in promoting sustainable solutions for the future energy patterns: the second edition (2008) was dedicated to Solar Energy, while the third edition (2011) allowed formulating major problems and possible solutions for the transition toward Sustainable Communities.

Considering the actuality of the topic, the fourth edition of the Conference for Sustainable Energy was dedicated to various aspects that support the transition toward nZEB. Gathering attendees from nine countries the conference represents an opportunity for ideas and experience exchange, and for networking in joint cooperation. This volume gathered papers that were presented during CSE 2014 and proved that promoting nZEB requires an interdisciplinary effort that implies almost all engineering topics, along with social acceptance and specific education and training.

The conference is developed under the patronage of the International Federation for the Promotion of Mechanism and Machine Science (IFToMM), through the Technical Committee Sustainable Energy Systems.

We are convinced that the papers in this volume represent an input for further research and for speeding up the implementation of nZEB as a main component of Sustainable Development.

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Ion Visa