

Energy for a Sustainable World

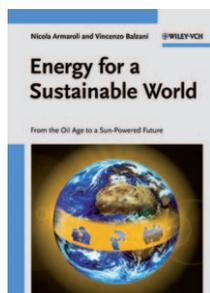
The engine of mankind's progress, which unfortunately is not equally shared, has been fed during the last two centuries by a steady and cheap flow of fossil fuels. It has only recently been recognized that this has major negative impacts on the earth and its inhabitants (environment, climate, etc.) and that these resources are not inexhaustible. In their remarkable, timely, and probably unprecedented book, two outstanding chemists, Nicola Armaroli and Vincenzo Balzani, remind us of that reality and provide us with an impressive amount of clear data and information about energy production and consumption (oil, gas, coal, and nuclear energy). They emphasize the urgent need to invest in the various alternative energy scenarios, based on innovative exploitation of renewable sources of energy (biomass, solar energy and solar-generated fuels such as hydrogen, photovoltaics, wind power, etc.), and to get us detoxified from fossil fuels. These two subjects are treated equally in the book. Interestingly, the authors have chosen an appropriate scientific and technical level so that their presentation is accessible to any citizen of our planet, who should be convinced, as I am myself, that the energy issue is the major challenge facing humanity in the 21st century. The recent Japanese tragedy will raise renewed doubts about the development of nuclear energy for some time, and even though current predictions indicated only a marginal increase of the contribution of nuclear power to the global energy supply, this challenge will generate increased controversy in countries such as France.

What are the solutions proposed here? As an obvious remedy on which we should all agree, the authors stress throughout the book the need for a drastic reduction in global energy consumption. That implies major changes in our energy-consuming habits, especially in affluent countries (the 12% of the world's population who live in the G8 countries consume 50% of the total energy supply), and also the development of new technologies for saving energy and improving the efficiency of energy systems. As the authors point out, it will not be easy for governments, especially during difficult times of economic and financial crisis, to ask people to change their lifestyle and to accept, at least temporarily, a lesser quality of life. Furthermore, this message might not be understood by a large fraction of the world's population (the 25% of the poorest people who consume only 3% of the global energy), who lack the minimal energy required for sufficient food and an adequate standard of health and education. It would be

immoral to ask them to avoid using, in the very near future, the fossil fuels and the nuclear plants that might improve their quality of life substantially. If one adds that the world's population will continue to grow up to 9 billions by the middle of this century, we cannot escape a requirement for global power production to increase to about 25 TW by 2050, the majority of which should be carbon-free, essentially electricity, as highlighted by Armaroli and Balzani.

The second solution recommended by the authors, again one on which everybody should agree, is an unprecedented development of new technologies based on renewable sources of energy. This implies that both fundamental and technological energy sciences, within chemistry, physics, and biology, should be financially supported by governments, industries, and research agencies up to a level that will inevitably involve a reduction in the support of other areas. These are not easy decisions to take. An important point raised by the authors is that we are not presently in a situation that allows us to limit our investment to only one technology. We really need to explore, scientifically and technologically, the various potential scenarios, and this shows how complex and expensive the pathway to the new society will be. On the other hand, it is disappointing that, even though they repeatedly emphasize their faith in science and technology, the authors seem to present a quite pessimistic view of our chances of solving the energy problem. They conclude that most of the possible solutions (biomass, nuclear energy, hydrogen, etc.) are insufficient and inadequate, when the huge amount of extra energy required (between 10 and 15 TW in 2050) is translated into quantities such as surfaces of PV modules, number of nuclear or carbon-burning plants, number of wind turbines, and total weight of batteries. Of course, this is true if a particular technology is supposed alone to supply the whole required power, but again, as stated above, this is not realistic and our future will depend on a mix of different renewable energy sources. In fact, we succeeded in increasing energy consumption from 2.8 TW in 1950 to 15 TW in 2010 by setting up complex infrastructures all over the world. We should be slightly more optimistic that humanity, on the basis of science and technology but also democracy, will succeed in inventing the novel infrastructures required to provide the carbon-free 15 TW needed in 2050.

Finally, the most important message, in my opinion, is in the positive statement that "the most abundant and inexhaustible resources that we can trust are renewable energies directly or indirectly related to sunlight", which explains why the authors have devoted a large proportion of their book to this topic. Therefore, I fully agree with the authors that, in the future, besides photovoltaics which



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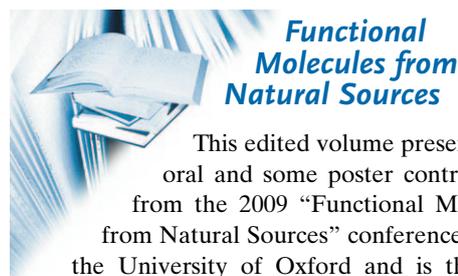
convert sunlight into electricity, the most important achievement will be artificial photosynthesis, a carbon-neutral process through which solar energy, combined with water and carbon dioxide, can be converted into fuels, hydrogen, methanol, and hydrocarbons. This is currently an extremely active field, but more research should be devoted to improving conversion efficiencies and overcoming the limitations of the low intensity and intermittency of sunlight.

There is no future other than a sustainable world. That is what we learn from Armaroli and Balzani, who have produced a reference book on this complex but essential question of future energy supplies.

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Functional Molecules from Natural Sources

This edited volume presents both oral and some poster contributions from the 2009 “Functional Molecules from Natural Sources” conference held at the University of Oxford and is the third edited volume in this series. The book consists of five sections that include eighteen chapters written by some of the leading researchers that work in the area of natural product chemistry and its applications.

Natural product chemistry continues to be very topical and has delivered the majority of frame-

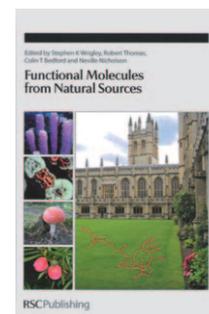
works for a number of clinically useful drugs, as well as providing valuable chemical leads in the agrochemical sector. Consequently, the value of this edited volume is indeed high and provides the expert and non-expert reader a snapshot of some of the latest developments in this area.

The range of topics covered in this volume will be of interest to those within the field of natural product science, as well as those engaged in medicinal chemistry and drug discovery. In general, the chapters are well written and presented, although additional referencing for some chapters would have improved the contribution. Section 1 of the volume provides a valuable perspective on the significance of natural products in the area of anticancer agent development as well as natural products in modulation of neurological disease. Sections 2 and 3 cover aspects of natural product exploitation and enhancement for use as antimicrobial agents particularly antibiotics and antimalarial agents. Section 4 provides a number of interesting contributions on natural product biosynthetic pathways that will give the reader insight to how nature constructs these valuable materials and how chemists may access and manipulate these pathways. Section 5 provides an overview of a number of contributions from the 2009 conference that have not been captured in other sections.

The editors have prepared a valuable contribution on natural product chemistry that will make a valuable addition to the broader chemistry community. The volume should be a must-read for those particularly involved in the area of medicinal chemistry.

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