

BOOK REVIEWS

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Book review of: *Our Renewable Future: Laying the Path for 100% Clean Energy* by Richard Heinberg and David Fridley. Island Press, Washington, DC, 2016. 248pp. ISBN-13: 978-1-61091-779-7 (paper), ISBN-13: 978-1-61091-780-3 (electronic)

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The science and research practices of the last few decades emphasize the growing ecological issues and crises caused by the activities of humankind, while obvious environmental problems have reached their critical point in the 21st century, and only continue to grow rapidly. In parallel, global population growth has led to an increase in the inefficient consumption of natural resources. This has resulted in immoderate depletion of non-renewable energy sources. There are forecasts that world energy consumption will peak in 2035, with the world economy entering into a prolonged depression after 2040. Also a result of energy production and consumption is an increase in green gases emissions and consequent global warming, with global carbon dioxide emissions from fossil fuels projected to peak in 2027. This leads to violations of the basic concept of sustainable development, i.e. the principle of intergenerational justice, which is defined as meeting the needs of present generations without jeopardizing the ability of future generations to meet their needs.

Our responses as a still post-industrial civilization to this unenviable situation are reflected not only in international agreements like the United Nations Framework Convention on Climate Change, the Kyoto Protocol, and foremost, the Paris Agreement, but in the body of theories and practices of this field, an example of which is the book - *Our Renewable Future: Laying the Path for 100% Clean Energy*. The work's authors are energy expert Richard Heinberg and scientist David Fridley, who in *Our Renewable Future* try to respond to the challenges brought about by the shift to 100 percent renewable energy as the transition to totally clean energy use.

Bearing the above in mind, the authors tried and succeeded in, through 248 pages, transparently covering most, if not all, major topics of this crucial issue. Thus, through 11 chapters in which they strived to answer the question: "How would a 100 percent renewable world look and feel?", Heinberg and Fridley focused on the following: the basics of energy, currently power society, energy supply and demand issues, energy quality, available renewable energy capacity, and conclusions about future energy supply.

For these reasons, the book's authors included the following: the Laws of Thermodynamics; energy returned on energy invested (EROEI, or EROI); Net energy analysis (NEA) (represents a basis for economic usefulness of any energy resources); Life cycle analysis (LCA) (evaluation of energy technologies as well as products and services); Energy Resource Criteria (energy density, direct monetary cost, other resources needed, renewability, scalability, location, reliability, transportability); Demand Management (managing the increased penetration of variable electricity generation such as solar and wind); transition to renewable transport fuel system; non-energy uses of fossil fuels as feed stocks; the problem of economic growth; nuclear energy (the same role as wind, hydro, and solar); transition of today's coal power industry to carbon capture and storage (CCS); the need for massive technology improvements; the injustice of today's energy wealth as well as energy problems of rapidly industrializing nations (China, India, and parts of Southeast

Asia); the role of governments in support of overall switch from fossil fuels to renewable energy and, last but not least – crucial national and international climate policies and a responsibility of every individual.

After all, the authors prioritize solar and wind as the primary recommended renewable sources, claiming that solar and wind have “spectacular growth”, especially solar, which will become the dominant electricity source by 2024. In view of this, the book presents two case studies of the most foremost countries in terms of renewable energy use, Spain and Germany. Spain has succeeded in ensuring 27.4 percent of its electricity is derived from solar and wind (in 2014) and Germany uses about 30 percent of electricity from renewable sources (including hydro).

Perhaps the most interesting part of the book is its forecasting the total amount of energy that we will need for “our 100 percent renewable future.” The work lists the following factors that will affect the future of energy supply: falling prices, technical improvements, public attitudes toward solar and wind energy, source intermittency, the need for storage and grid redesign, and the difficulties of electrifying heavy transport and many industrial processes. But it also presents the largest aggravating circumstance related to transitioning our economy to 100 percent renewable energy – “How shall we maintain social and material benefits to the world’s people as population continues to grow, but energy availability declines and economies stall and contract?”

Finally, if stopping climate change is our goal (and it is), it’s no doubt that *Our Renewable Future: Laying the Path for 100% Clean Energy* is a must-read, because as authors Heinberg and Fridley put it – “It’s all about energy.”

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About the Author

Nataša Petrović

Faculty of Organizational Sciences, University of Belgrade, Serbia
E-mail: petrovicn@fon.bg.ac.rs



Dr Natasa B. Petrovic is a Full Professor at the University of Belgrade - Faculty of Organizational Sciences, Serbia, where she acquired her M.Sc. (1999) and Ph.D. (2002) degrees in Environmental management. She is the founder and head of Centre for Environmental Management and Sustainable Development.

Areas of her research include: Environmental Management, Environmental Science, Sustainable Development, Green Marketing, Environmental Education and Education for Sustainable Development, Climate Change Education, Environmental Risk Management, Sustainable Energy Management.