

BOOK REVIEWS



Biomass to Biofuels: Strategies for Global Industries

Alain A. Vertès, Nasib Qureshi, Hideaki Yukawa and Hans P. Blaschek (Editors) (2010), Wiley: Chichester. 559 pages. Paperback. ISBN: 978-0-470-51312-5

The energy supply issue is one of the major problems faced by nations worldwide, mainly due to the limited availability and increasing price of fossil fuels. In response to this, many countries have been investigating and developing alternative sources that can provide energy which is feasible, renewable, and sustainable. Biomass is currently seen as one of the renewable energy feedstocks as it is extensively available and, to date, only a small portion of the available stock has been exploited. As well as providing energy, the use of biomass feedstock contributes to decreasing the potential threats (e.g. ozone layer depletion, etc.) from greenhouse gas (GHG) emissions. With increasing awareness that future energy resources should have many benefits from the triple bottom-line aspect - that is, *environmental*, *social* and *economic* considerations - and the growing global demand for renewable energy, the call to intensively and extensively optimise biomass feedstock as biofuels resources has become a priority for researchers and governments. This book, which comes in both paperback and digital versions, provides an overview of a range of aspects in relation to searching

for and expanding biofuels from biomass feedstock, including the potency of biomass supply and the biofuels markets, the conversion process and technology, and related policies and regulations, among other issues. The book covers current issues and is suitable for academic customers for educational purposes. In addition, the use of schematic diagrams, case studies and examples related to previous and current research and/or experiences in establishing and building biofuels from biomass feedstock in the global arena means that this book should be useful for readers from different backgrounds and disciplines either for personal improvement or practical purposes.

The book contains contributions from many scientists relating to the generation of biofuels from various type of biomass feedstock. The book is divided into five chapters; each comprises a number of sub-sections providing a short explanation of the topic supported by data and examples. The first contains a brief history is outlined of why biofuels from biomass are required in relation to the increase in petroleum price, the oil crisis, and the growing demand for sustainable energy, in both the domestic and industrial spheres. Further, in greater depth, it explains the potential for, and the increase in demand and markets over the first generation of biofuels (ethanol) in both developed and developing countries. The authors explain that conventional usage of biomass as a biofuel

resource has been proven ineffective, leading to the requirement for more modern, feasible and cost-effective technology for production and utilisation. The authors claim that these requirements can be achieved if the location of the operating factory is close to the biomass feedstock source, in order to minimise transportation costs. High-value co-products or by-products are also generated during biofuel production which can generate additional income, the use mixture of biomass feedstock is possible, or the engineering-improved bioprocessing microorganism is utilised. Indeed, this book not only briefly mentions the importance of the genetically modified microorganism in biofuels production, but also details specific policies and regulations that regulate and control the use of the modified microorganism, an area which is clearly open to debate. However, the book refers only briefly to the alternatives of the second-generation of biomass feedstock for biofuels production such as energy crops, agricultural residues, and woody biomass - this is open for a more detailed explanation and discussion in a future volume.

The second, third and fourth chapters of this book focus on biofuel products (e.g. biodiesel, ethanol, butanol, hydrogen, methane and methanol) derived from various biomass feedstock. For example, the biodiesel potential from micro- and macro-algae which is currently one of the potential forms of biomass being explored is also discussed. Furthermore, in these sections, the reader's attention is drawn to a brief introduction on definition, properties and characteristics of biofuels, the conversion technique and process involved, and the limiting factors on biofuels production. This book also provides a brief explanation on the conversion process of biofuels production including thermal,

biological, chemical, enzymatic, thermo-chemical, and bio-chemical treatments. Several case studies and examples of technologies that are available and commercially proven in several companies from different countries (e.g. Brazil, the EU, the US, Japan, etc.) are provided, which gives additional value to the book. The potential range of uses for biomass is also explored through the provision of data and statistics relating to potential energy yields, GHG reductions from the use of derived biofuels, and economic benefits. The book also highlights both technological and business development rationales, and further development on these aspects is necessary to expand biofuels production on a world-wide scale. The authors explain that knowing the major composition of biomass is the first important step in the overall process, as this determines the potential technology suitable for converting biomass to biofuels, but methods or protocols for analysing the biomass composition and calculating the energy potential are provided only briefly and would benefit from a more detailed explanation which would add value to the book.

The authors also note that the barriers faced in biofuels production are related to the availability of first-generation biomass feedstock (e.g. corn, wheat or maize) as they conflict with food supply and food security, the lack of land availability, and/or issues with the policies and regulations. Some issues related to technological, economic, and environment aspects have also been raised by the authors. In the case of the technological aspect, issues discussed include how to enhance the efficiency of the conversion process in relation to the parametric value of biomass; and what the optimal biomass composition is for use in certain conversion technology. The

economic consideration relates to the issue of high operational costs, in particular high cost of feedstock or technology. From the environmental stance, how to meet the standard specification for biofuels or on other potential environmental threats and emissions generated other than GHGs and particular matters are discussed. In this regard, the book clearly demonstrates that there is ongoing debate over the use of biomass feedstock as a biofuels resource. Finally, the last chapter of the book offers perspectives on technological developments to enhance the composition and characteristics of biomass feedstock and the challenges that might be faced or considered in the future.

In general, the book provides a foundation for understanding the potential of biofuels derived from biomass feedstock, particularly for early readers, but it might be less useful for more 'technical' readers who may wish to focus in greater depth on certain biofuels. Nevertheless, this book offers valuable information which helps deliver a clear understanding of why it is important to find sustainable energy resources and why utilising biomass as a feedstock for future energy is both potential and critical.

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Digital Republic: India's Rise to IT Power

Mathai Joseph (2013), 1 Power Publishers, Kolkata, 143 pages.
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Despite the unparalleled success since the 1990s of India's IT industry - today valued

at \$100 billion - there are surprisingly few good books about it, and even fewer about the history of computing in India: perhaps the only journalist Dinesh Sharma's *The Long Revolution: The Birth and Growth of India's IT Industry* (2009). *Digital Republic: India's Rise to IT Power*, is a shorter book than Sharma's, and is both a history and a personal memoir by a significant Indian computer scientist, Mathai Joseph, it is therefore required reading for anyone trying to understand the development of digital computing in India from its shaky beginnings in 1955. Not only has its author worked at several key institutions - including Cambridge University during the 1960s, the Tata Institute of Fundamental Research in Mumbai and Tata Consultancy Services in Pune (where he retired in 2007 as head of research) - he also writes with directness, candour and variety, telling pointed and often amusing anecdotes about research and life in India, the UK and the USA from the 1950s until now.

Neither the Indian government nor Indian academia has served computing well. 'Of all the industries expected to create a technological transformation in India, this was the one least likely to succeed', Joseph writes. Soon after Independence in 1947, the government began to lavish attention on space and nuclear power but it controlled computers as if they were a 'danger' to employment, without the least vision of their ultimate importance. The situation became so discouraging for Joseph by 1985 that he abandoned his secure position in Mumbai and moved to the University of Warwick until 1997. The reason for the software industry's 1990s success was precisely that software did not fall under any established government categorization. For a long time, it 'was not even recognized as an industry.'

But, as he readily concedes, this commercial expansion has yet to invigorate either India R&D in IT or academic computer science, where the research community has remained virtually the same size for past two decades and ‘has produced only a few notable successes’, such as the internationally award-winning AKS primality test by Manindra Agrawal et al. to determine prime numbers. *Digital Republic* adds constructively to this debate and should help, we hope, to develop and improve computer science in India.

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Andrew Robinson is a former Visiting Fellow of Wolfson College, Cambridge. He is based in London and is now a full-time writer.

[Note that Prof. Mathai Joseph was Prof. Zhiming Liu’s PhD supervisor and Zhiming is mentioned in the book. This review also appeared on the British Computer Society website under <http://www.bcs.org/content/conWebDoc/52077> .]