Bilaal Abdullah, Peak Oil Paradigm Shift: The Urgent Need for a Sustainable Energy Model, Medianet, Limited, St. James, Trinidad and Tobago, 2004–2005, 149 pages, US$ 24, 8 in. × 6 in. format, ISBN 976-95137-0-9 (hardcover), 976-95137-1-7 (paperback).

One of the slides I used in my speeches contained the line, "A genius is someone who shoots at a target he cannot see and hits the bullseye." The author of this book has done that. Indeed, as I write, the United States is trying to recover from the ravages of Hurricanes Katrina and Rita and the impact that they and other events have had on the supply and price of oil. As a result of the problems caused by them, gasoline prices have risen sharply in North America with the public placing the blame on avaricious oil companies as they await (hopefully) for relief at the gasoline pumps. There may be some price reductions coming in the short run, but in the long run, the author comes out with a resounding, "No!"

Oil production, Abdullah writes, has peaked and the worldwide supply of oil will continue to decrease with time. Unfortunately, demand will not. Indeed, demand for oil will increase, especially in developing nations such as China. The author presents information through excellent graphs showing a bell-shaped curve for oil production as a function of time. The peak of this curve is very close to the present time with decreasing productions being shown soon. Another graph has no peak as Abdullah predicts worldwide energy consumption for the various fuel sources.

Other sources of energy are also reviewed. Natural gas shows a similar fate to oil.

Hydrogen as a replacement for oil is discussed. However, the author notes: "One of the biggest falsehoods being promised is that hydrogen can easily be substituted for oil and natural gas as a transportation fuel. It has often been pointed out that a virtually inexhaustible supply of water exists from which hydrogen can be derived. However, the reaction that converts water to hydrogen and oxygen requires a substantial energy investment per unit of water. This energy investment is required by elementary principles of chemistry and can never be reduced."

The author goes on to note that: "It takes 1.3 Kilo-Watt an Hour of electricity to produce hydrogen with an energy value of 1 Kilo-Watt Hour. Hydrogen from electrolysis is therefore an energy 'carrier' not a 'source' of energy like oil."

Ethanol as an energy carrier is also discussed. Abdullah says that it takes 71% more energy to produce ethanol than the product supplies. While I cannot vouch for the 71% figure, I can agree with his assertion that there is a net energy loss in the production of ethanol. Many years ago when I was actively teaching, I began my biochemical engineering course with a discussion of ethanol production and ended the lecture with a note that there was a negative output of energy in ethanol production. The author's discussion of energy production versus consumption did not even include the agricultural energy use in grain production. The scenario is more favorable, however, in Brazil, the author notes, where ethanol is produced from sugar cane rather than from corn. "In Brazil, the cost of ethanol over the entire cycle of production, including farming, transportation and distribution is about 63 cents per gallon, which is substantially lower than the current world prices for gasoline." However, the author's discussion only focuses on cost, not energy utilization.

In the past, I have not been a keen supporter of wind and solar power for energy production but reading this book changed my perspective on these power sources. While both sources of energy are still expensive and weather-dependent, they do supply energy from a renewable source.

Regarding solar power, Abdullah writes: "Harvesting energy from the sun can be accomplished using a range of methodologies with widely varying degrees of technological sophistication. An example of low-tech solar energy would be simple flat plate collector used in many domestic water heaters, which can provide 50% to 100% of a family's hot water requirements depending on location, demand and other factors."

Nuclear power plants are also discussed as an energy source. Unfortunately, the author notes, "It is also estimated that the world's uranium reserves would only last about 25 years if an attempt is made to aggressively replace oil and natural gas with nuclear power for electricity generation." Nuclear power also suffers from extremely high cost of construction as well as the public concern for the long-term radioactive waste residual storage.

The book ends on a pessimistic note (made very real by the current oil crisis of mid-2005). The author writes: "It is unlikely that all the world's governments will respond effectively to the looming crises, but this only makes it more urgent for those nations, communities and individuals who recognize Peak Oil as having a fundamental influence on their future to act swiftly and resolutely to prepare for the changed circumstances that will result when Cheap Oil runs out . . . IN THE NEAR FUTURE!"

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I. Cameron, R. Raman, Process Systems Risk Management, Elsevier/Academic Press, Amsterdam, The Netherlands, 2005, 629 pp., US$ 120.95, GBP 75, €110, ISBN 0-12-156932-2.

Industry, especially the chemical industry, has suffered in public perception due to a number of devastating accidents, some of which (the Exxon Valdez, for example) resulted in significant environmental damage while others (Bhopal and Flixborough)

caused deaths of numerous innocent people. Each of these major events has caused much public concern and increased scrutiny of the chemical industry. Ergo, the importance of the topic "Risk Management."

Thus there is a crucial need for risk managers to meet tightened safety regulations, to seek more informed risk management techniques and to adopt formal risk management systems. The authors note, "... the subject of risk management has been steadily gaining prominence in the last 25 years." There is a requirement to meet the Common Law Duty of Care as well as, for commercial reasons, minimizing production interruption. Early in the book, the authors discuss the nature and role of management in the above processes, which they say, at the very least, includes these tasks:

- risk assessment (analysis and evaluation);
- risk treatment (elimination, mitigation, transfer);
- risk acceptance (tolerability/acceptability criteria);
- risk communication (information sharing with stakeholders);
- risk monitoring (auditing, evaluation, compliance).

The main risk categories in chemical processes include:

- occupational risks (safety and health of employees);
- plant property loss;
- environmental risks (safety and health of public, biosphere, heritage);
- liability risks (public, product, failure to provide service, legal prosecution);
- business interruption risks;
- project risks (design, contract, delivery).

An early table in the book lists selected major chemical incidents. The table begins with data on an ammonium nitrate explosion in Oppau, Germany, in 1921 when 561 deaths occurred. More than 40 more incidents are tabled ending with a report about a natural gas explosion and fire in Skikda, Algeria, in 2004; there were 27 deaths and 72 injuries.

Risk management is defined by the authors as:

> "... a vital systems activity across design, implementation and operations phases of a process system. This integrative systems perspective is often missing or poorly emphasized in much of the risk management literature. The purpose of this volume is to present a holistic approach to process risk management that is firmly grounded in systems engineering employing a life cycle comprehensive 'cradle to the grave' approach."

The authors cover the topic clearly and extensively in the following 15 well-written chapters, much of which has been utilized in their short course as well as in a course taught by one of the authors at the University of Queensland, Australia:

(1) managing risks from process systems;
(2) risk—estimation, presentation and perception;
(3) system models for risk management;
(4) identifying hazards and operational problems;
(5) analysing the consequences of incidents;
(6) effect models for consequence analysis;
(7) vulnerability models;
(8) estimating the likelihood of incidents;
(9) risk estimation;
(10) decision making under uncertainty;
(11) process safety management systems;
(12) 12 life cycle risk management tools;
(13) management of major hazard facilities;
(14) auditing process safety management systems;
(15) land use planning risk management.

The authors write clearly, concisely and authoritatively including numerous excellent examples to illustrate their points.

They end each chapter with a review of the material just covered. Noted in the book is the existence of a website that the authors say has a full presentation of material supplemental to the text.

The book should be extremely useful not only to industrial practitioners but also to regulatory officials and university faculty.

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Carlos A.M. Afonso, Joao G. Crespo (Eds.), Green Separation Processes: Fundamentals and Applications, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany, 2005, 382 pages, US$ 180.00, ISBN 3-527-30985-3.

Sustainability and Green Chemistry are two topics appearing routinely in the literature. This book adds to that process in a very useful way. Thirty-five authors from nine different countries contributed to this very timely technical discussion of the topic.

James Clark (University of York, UK) begins the first chapter with a definition of the term: "Green Chemistry is the universally accepted term to describe the movement towards more environmentally acceptable processes and products." Green Chemistry, Clark notes, was "... coined by staff at the U.S. EPA in the 1990s ...." The use of this term "... helped to bring focus to an increasing interest in developing environmentally friendly chemical processes and products."