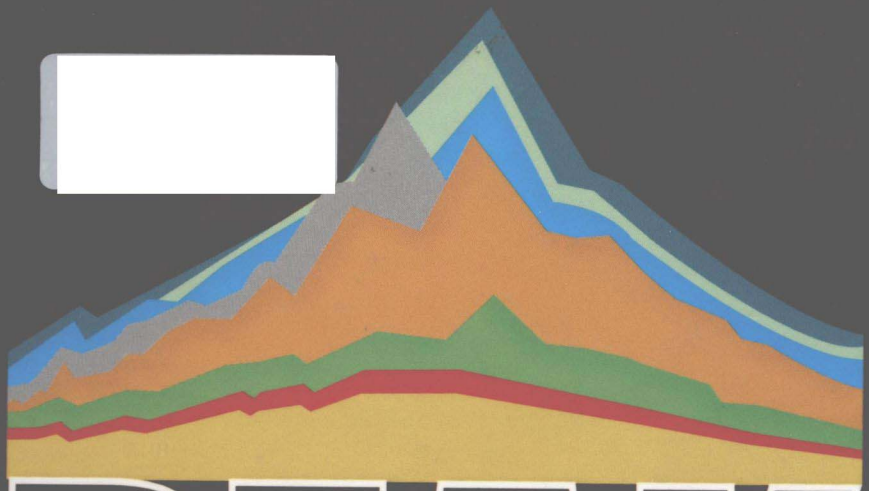

PEAK ENERGY

MYTH OR REALITY?

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Scrivener Publishing

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Peak Energy: Myth or Reality?

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WILEY

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Preface

Crude oil, natural gas, and coal are the major sources of fuel used to supply energy for various needs. Users of crude oil, natural gas, and coal must take into account that these energy sources are, without doubt, non-renewable depleting resources, and the cost of extraction depends not only on the current rate of production but also on the amount of cumulative production. In fact, while coal is projected to last for another two hundred years or so at current rates of use, after which crude oil and natural gas will no longer be in ready supply.

This phenomenon has given rise to the *peak oil theory* – peak oil is the point in time when the maximum rate of petroleum recovery from the reservoir is reached, after which the rate of petroleum production enters terminal decline. From this concept has emerged the wider concept of the *peak energy theory* which, as it is related to the availability of all fossil fuels, is also subject to decline with fossil fuel use. At this time it is worthy of note that the term *peak oil* is often used synonymously and interchangeably with the term *peak energy* – crude oil being the most abundant form of energy – and the terms are used interchangeably throughout this book.

The issues related to crude oil and natural gas supply and energy generation arose from the concept that both crude oil and natural gas, like any finite natural resource, have a limited lifetime that is dependent upon use (energy demand). From that, the term peak oil arose, which refers to the maximum rate of oil production, after which the rate of production enters terminal decline. Peak oil production usually occurs after approximately half of the recoverable oil in an oil reserve has been produced (i.e., extracted). The theory also espouses that the rate of world oil production cannot increase and that oil production will inevitably and irreversibly thereafter decrease with time, even if the demand for oil remains the same or increases. Following from this, the term peak energy is the point in time after which energy production declines and the production of energy from various energy sources is in decline. However, what the peak oil theory ignores is that in many oil-producing nations production declines have been offset by discoveries and production growth elsewhere in the world.

Petroleum might be in the position as voiced by the immortal saying of Mark Twain – the rumors of my death have been greatly exaggerated!

It is not the purpose of this book to deny that the rate of depletion of any finite natural resource increases with time – assuming that the total natural resource is known and acknowledged. However, this book responds to the notions that predict the immediate death of crude oil as well as natural gas and, hence, energy production, and explores the reality of crude oil stocks and the availability of other resources to continue the necessary production of all forms of energy. In fact, the concern over crude oil supplies and other energy supplies lies mostly in the misuse of data that supposedly indicate that the world is approaching an energy precipice in which fossil fuels will no longer be available for use as energy sources – the date the energy precipice is reached is wildly speculative and, in many cases, totally unrealistic.

Fossil fuel energy sources (defined as "recoverable" in today's term) will undoubtedly reach a depletion point in the future when these energy sources are no longer available, but not at the moment or even within the next 50 years; the reality of reserve/production ratios dispels the notion of the short lifetime of energy-producing resources. At the same time, the evolution of technologies that continue to lift the lid of "recoverability" will help recover supposedly unrecoverable oil from depleted reservoirs, and new gas-fired generating units use highly efficient technologies and are supported by abundant gas supplies. Added to that are the continual discoveries of new reserves and the moving of the boundary of conventional oil and gas. These issues are not always taken into account by the *precipice theorists*.

The issue of crude oil reserves and natural gas reserves – as well as the future of the petroleum refinery – and the reserves of other energy sources are discussed in the context of peak energy and the manner in which energy production scenarios can be prolonged well into the future.

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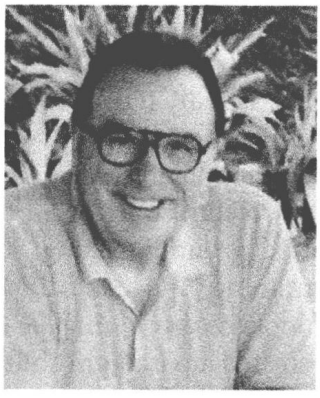

Dr. James G. Speight, who has doctorate degrees in Chemistry, Geological Sciences, and Petroleum Engineering, is the author of more than 60 books in petroleum science, petroleum engineering, and environmental sciences. He has served as Adjunct Professor in the Department of Chemical and Fuels Engineering at the University of Utah and in the Departments of Chemistry and Chemical and Petroleum Engineering at the University of Wyoming. In addition he has been a Visiting Professor in Chemical Engineering at the following universities: the University of Missouri-Columbia, the Technical University of Denmark, and the University of Trinidad and Tobago.

As a result of his work, Dr. Speight has been honored as the recipient of the following awards:

- Diploma of Honor, United States National Petroleum Engineering Society. *For Outstanding Contributions to the Petroleum Industry, 1995.*
- Gold Medal of the Russian Academy of Sciences. *For Outstanding Work in the Area of Petroleum Science.* 1996.
- Einstein Medal of the Russian Academy of Sciences. *In recognition of Outstanding Contributions and Service in the field of Geologic Sciences.* 2001.
- Gold Medal – Scientists without Frontiers, Russian Academy of Sciences. *In recognition of His Continuous Encouragement of Scientists to Work Together across International Borders.* 2005.

- Methanex Distinguished Professor, University of Trinidad and Tobago. *In Recognition of Excellence in Research*. 2006.
- Gold Medal – Giants of Science and Engineering, Russian Academy of Sciences. *In recognition of Continued Excellence in Science and Engineering*. 2006.

Dr. M. Rafiqul Islam

Professor M. R. Islam is a worldwide consultant on environment and energy-related issues. He is currently director of Oil and Gas at Trans Canada Training. Dr. Islam is known as the most published engineer in the world. He is credited with the coining of terms such as "green petroleum" and "sustainable petroleum development" at a time when "sustainable petroleum" was considered to be an oxymoron. His groundbreaking approach in research, training, and education is summarized in his book *Reconstituting the Curriculum* (Wiley-Scrivener, 2013). His work has created a paradigm shift in a wide range of applications, spanning various disciplines.

Dr. Islam's most notable contribution is in the areas of sustainability, environmental integrity, and knowledge modeling, on which topics he has written dozens of books and over 700 research papers. His latest works are captured in his book: *Unconventional Gas Reservoirs* (Elsevier, 2014) and *Greening of Pharmaceutical Engineering* (Scrivener-Wiley). During the 30 years of his professional career, Professor Islam has held faculty positions with seven different universities and supervised over 150 research students and post-doctoral fellows. He received $30 million in research funding from various government and industrial entities. His research spun off a number of technology transfer projects that led to the development of three companies. One of them has now become one of the most innovative oil spill remediation technology development companies.

From 2000 through 2005, Dr. Islam held the Killam Research Chair Professor in Oil and Gas, which was the only Petroleum Engineering Research Chair in Canada. Prior to this, Dr. Islam was the first NRCan (Natural Resources Canada) professor of engineering at the University of Regina, where he was the program leader of petroleum engineering. He was instrumental in establishing the Petroleum Technology Research Center

(PTRC) and the Greenhouse GasTechnology Center (GTC) in Regina. Dr. Islam has written over 700 research articles on various modeling, management, energy, environmental, and communication-related topics.

During the same period, he received more than $20 million in institutional and over $10 million in individual research grants, and employed over 150 post-doctoral fellows, and graduate and undergraduate research students. In recognition of his research and teaching excellence, he has received a number of international awards, including the Einstein Gold Medal of Honor, and the Crown and Eagle Gold Medal, for both of which Dr. Islam is the first recipient in Canada. He has taught 30 different academic courses and some dozen industry professional development workshops around the world. He has also given numerous invited and guest speeches in many countries.

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