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The Promise and the Peril

"An excellent objective explanation of the history, science, technology, politics, environmental concerns, and economics of the shale gas boom. The author clearly has great practical experience of the science and technology of shale gas development and shows a deep understanding of the environmental and economic issues." --Andrew Stone, Executive Director, American Ground Water Trust
New technology has opened vast reserves of "unconventional" natural gas and oil from shales like the Marcellus in the Appalachian Basin, making the United States essentially energy independent for the first time in decades. Shale gas had its origins in the oil embargos and energy crises of the 1970s, which led to government research to increase domestic energy supplies. The first large-scale shale gas production was successful on the Barnett Shale in Texas in the late 1990s, followed a few years later by the Marcellus Shale in Pennsylvania. Shale gas has changed thinking about fossil energy supplies worldwide, but the development of these resources has been controversial. Activists have made claims that hydraulic fracturing may contribute to climate change, threaten groundwater resources, and pose risks to terrestrial and aquatic ecosystems, and human health. This volume explores the geology, history, technology, and potential environmental impacts of Marcellus Shale gas resources.

The series "Commodities at a Glance" aims to collect, present and disseminate accurate and relevant statistical information linked to international primary commodity markets in a clear, concise and reader-friendly format. The report aims to

provide information on the critical raw materials used in LIBs with respect to production, consumption, trade and prices.

Handbook of Energy, Volume II: Chronologies, Top Ten Lists, and Word Clouds draws together a comprehensive account of the energy field from the prestigious and award-winning authors of the Encyclopedia of Energy (2004), The Dictionary of Energy, Expanded Edition (2009), and the Handbook of Energy, Volume I (2013). Handbook of Energy, Volume II takes the wealth of information about historical aspects of energy spread across many books, journals, websites, disciplines, ideologies, and user communities and synthesizes the information in one central repository. This book meets the needs of a diverse readership working in energy, and serves as a vital method of communication among communities including colleges and universities, nongovernmental organizations, government agencies, consulting firms and research institutes of energy, environmental, and public policy issues. Interdisciplinary coverage appropriate for scientists in environmental sciences, social and natural sciences, and engineering Top Ten lists, written by prominent subject experts, provide personal reflections on key issues Chronologies covering 40 different subject areas provide all the significant events in a given field from the geologic past to the present day

Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States
The Real Cost of Fracking
Dispatches from the Frack Zone
Special Issue on Strategic Battery Raw Materials
The American Shales
The Shale Gas Shock
A Global Perspective on Fracking and Shale Development

As unconventional reservoir activity grows in demand, reservoir engineers relying on history matching are challenged with this time-consuming

task in order to characterize hydraulic fracture and reservoir properties, which are expensive and difficult to obtain. Assisted History Matching for Unconventional Reservoirs delivers a critical tool for today's engineers proposing an Assisted History Matching (AHM) workflow. The AHM workflow has benefits of quantifying uncertainty without bias or being trapped in any local minima and this reference helps the engineer integrate an efficient and non-intrusive model for fractures that work with any commercial simulator. Additional benefits include various applications of field case studies such as the Marcellus shale play and visuals on the advantages and disadvantages of alternative models. Rounding out with additional references for deeper learning, Assisted History Matching for Unconventional Reservoirs gives reservoir engineers a holistic view on how to model today's fractures and unconventional reservoirs. Provides understanding on simulations for hydraulic fractures, natural fractures, and shale reservoirs using embedded discrete fracture model (EDFM)
Reviews automatic and assisted history matching algorithms including visuals on advantages and limitations of each model Captures data on uncertainties of fractures and reservoir properties for better probabilistic production forecasting and well placement
The US shale boom and efforts by other countries to exploit their shale resources could reshape energy and environmental landscapes across the world. But how might those landscapes change? Will countries with significant physical reserves try to exploit them? Will they protect or harm local communities and the global climate? Will the benefits be shared or retained by powerful interests? And how will these decisions be made? The Shale Dilemma brings together experts working at the forefront of shale gas issues on four continents to explain how

countries reach their decisions on shale development. Using a common analytical framework, the authors identify both local factors and transnational patterns in the decision-making process. Eight case studies reveal the trade-offs each country makes as it decides whether to pursue, delay, or block development. Those outcomes in turn reflect the nature of a country's political process and the power of interest groups on both sides of the issue. The contributors also ask whether the economic arguments made by the shale industry and its government supporters have overshadowed the concerns of local communities for information on the effects of shale operations, and for tax policies and regulations to ensure broad-based economic development and environmental protection. As an informative and even-handed account, *The Shale Dilemma* recommends practical steps to help countries reach better, more transparent, and more far-sighted decisions.

Shale Gas and Fracking: The Science Behind the Controversy explains the relevant geological principles before examining the peer-reviewed evidence and presenting it through a simple and compelling illustrated narrative. Each chapter focuses on a particular controversy, such as contamination of well water with gas from fracking, and follows a similar format: starting with the principles; then detailing peer-reviewed case studies for earthquakes, radioactivity, and climate change; and concluding with a judgment of the general risks involved. *Shale Gas and Fracking: The Science Behind the Controversy* provides readers with the unbiased information they need to make informed decisions on the controversial issue of fracking. Presents a clear and unbiased view of the pros and cons of fracking in Europe and the US, through a simple and compelling narrative from an informed publicly-funded scientist. Includes full-colour diagrams, photographs, and maps to present information clearly and simply. Focuses on peer-reviewed, documented examples, particularly of earthquakes and groundwater contamination due to fracking.

Is natural gas the 'bridge' to our low-carbon future? In power generation, industrial processes, parts of the transportation sector, and for domestic

use, natural gas still has the potential to play a greater role in various energy transition pathways around the world. But such a future is by no means certain. In this book, Michael Bradshaw and Tim Boersma offer a sober and balanced assessment of the place of natural gas in the global energy mix today, and the uncertainties that cloud our understanding of what that role may look like in the future. They argue that natural gas has become prominent in recent decades, spurred by two revolutions: the first has been the rise of unconventional natural gas production, and the second the coming of age of the market for liquefied natural gas (LNG). However, a third revolution is required to secure natural gas' long-term role in various energy transition pathways, as countries are increasingly pushing to address air quality concerns and curtail greenhouse gas emissions. This revolution has to take place as politicians, citizens, investors and shareholders are becoming increasingly vocal about the need to improve the environmental footprint of the fuel, while simultaneously, and perhaps paradoxically, demand for it continues to grow, in a world where geopolitical challenges seem to be mounting.

Unconventional: Natural Gas Development from Marcellus Shale After the US Shale Gas Revolution
The Natural Gas Revolution: Exploration and Environmental and Economic Impacts
Energy and Climate Under the Surface
Fracking, Fortunes, and the Fate of the Marcellus Shale

The rapid spread of 'fracking' (hydraulic fracturing) has temporarily boosted natural gas and oil production, particularly in the USA, but it has also sparked a massive environmental backlash in local communities. The fossil fuel industry is promoting fracking as the biggest energy development of the century, with seductive promises of energy independence and benefits to local economies. *Snake Oil* casts a critical eye on the oil-industry hype that has hijacked the discussion over energy security. This is the first book to look at fracking from both economic and environmental perspectives, informed by the most thorough analysis of shale gas and oil drilling data ever undertaken. Is fracking the miracle cure-all to our energy ills, or a costly distraction from the necessary work of reducing our fossil fuel dependence?

This second edition of *Historical Dictionary of the Petroleum Industry* contains a chronology,

an introduction, appendixes, and an extensive bibliography. The dictionary section has over 500 cross-referenced entries on companies, people, events, technologies, countries, provinces, cities, and regions.

Shale Gas: Exploration and Environmental and Economic Impacts explores the shale gas exploration and production activities that are increasing globally, also presenting a basic understanding on the geological, geochemical, and geophysical aspects. The book is a key reference that is useful for researchers, the oil and gas industry, and policymakers in gas producing and prospective countries. Users will find chapters on hydraulic fracturing and shale gas drilling, as well as the environmental and economic impacts of these activities. Further chapters include case studies on the shale gas revolution in the United States and other producing countries around the world. Provides wide-ranging coverage of both the environmental and economic impacts of shale gas exploration. Includes case studies that describe the prolific and potential shale gas systems from both producing and prospective countries. Appeals to both those in academia and those in the unconventional gas exploration industry.

This volume presents the reader with a comprehensive account of the development of shale oil and gas reserves globally. This study provides a comparative perspective that enables readers to situate the unique US experience in a broader global context and appreciate the limitations of reproducing it elsewhere in the immediate future.

The Outrageous Inside Story of the New Billionaire Wildcatters

Global Energy

Meeting the Transportation, Pipeline, and Rail Needs to Renew American Manufacturing : Field Hearing Before the Committee on Commerce, Science, and Transportation, United States Senate, One Hundred Twelfth Congress, Second Session, April 11, 2012
Hearing Before the Committee on Energy and Natural Resources, United States Senate, One Hundred Twelfth Congress, First Session, to Receive Testimony on the Recent Report of the MIT Energy Initiative Entitled "The Future of Natural Gas," July 19, 2011

The Shale Dilemma

Global Impact of Unconventional Energy Resources

At the Pivot of the World's Energy Future
The history of the U.S. shale plays, their founders and their leaders—from rich rock, unconventional ideas and unwavering determination to a renewed world energy future.

A guide to environmental and communication issues related to fracking and the best approach to protect communities. *Environmental Considerations Associated with Hydraulic Fracturing Operations* offers a much-needed resource that explores the complex challenges of fracking by providing an understanding of the environmental and communication issues that are inherent with hydraulic fracturing. The book balances the current

scientific knowledge with the uncertainty and risks associated with hydraulic fracturing. In addition, the authors offer targeted approaches for helping to keep communities safe. The authors include an overview of the historical development of hydraulic fracturing and the technology currently employed. The book also explores the risk, prevention, and mitigation factors that are associated with fracturing. The authors also include legal cases, regulatory issues, and data on the cost of recovery. The volume presents audit checklists for gathering critical information and documentation to support the reliability of the current environmental conditions related to fracking operations and the impact fracking can have on a community. This vital resource: Contains the technical information and mitigation recommendations for safety and environmental issues related to hydraulic fracturing Offers an historical overview of conventional and unconventional oil and gas drilling Explains the geologic and technical issues associated with fracking of tight sand and shale formulations Presents numerous case studies from the United States EPA and other agencies Discusses issues of co-produced waste water and induced seismicity from the injection of wastewater Written for environmental scientists, geologists, engineers, regulators, city planners, attorneys, foresters, wildlife biologists, and others, Environmental Considerations Associated with Hydraulic Fracturing Operations offers a comprehensive resource to the complex environmental and communication issues related to fracking.

Technological progress in the exploration and production of oil and gas during the 2000s has led to a boom in upstream investment and has increased the domestic supply of fossil fuels. It is unknown, however, how many jobs this boom has created. We use time-series methods at the national level and dynamic panel methods at the state-level to understand how the increase in exploration and production activity has impacted employment. We find robust statistical support for the hypothesis that changes in drilling for oil and gas as captured by rig-counts do in fact, have an economically meaningful and positive impact on employment. The strongest impact is contemporaneous, though months later in the year also experience statistically and economically meaningful growth. Once dynamic effects are accounted for, we estimate that an additional rig-count results in the creation of 37 jobs immediately and 224 jobs in the long run, though our robustness checks suggest that these multipliers could be bigger.

“ A rare, honest, beautiful, and, yes, sometimes heartbreaking examination of the echoes of water-powered natural gas drilling—or fracking—in the human community . . . vivid, personal and emotional. ” —Minneapolis Star Tribune
Susquehanna County, in the remote northeastern corner of Pennsylvania, is a community of stoic, low-income dairy farmers and homesteaders seeking haven from suburban sprawl—and the site of the Marcellus Shale, a natural gas deposit worth more than one trillion dollars. In *The End of Country*, journalist and area native Seamus McGraw opens a window on the battle for control of this land, revealing a conflict that pits petrodollar billionaires and the forces of corporate America against a band of locals determined to extract their fair share of the windfall—but not at the cost of their values or their way of life. Rich with a sense of place and populated by unforgettable personalities, McGraw tells a tale of greed, hubris, and envy, but also of hope, family, and

the land that binds them all together. “ To tell a great story, you need a great story. Seamus McGraw . . . has lived a great story. . . . [He] is just one of its many characters—very real characters—caught up in a very human story in which they must make tough, life-altering decisions for themselves, their community, and ultimately their country. ” —Allentown Morning Call
“ Compelling . . . The End of Country is like a phone call from a close friend or relative living smack-dab in the middle of the Pennsylvania gas rush. . . . Anyone with even a passing interest in the [fracking debate should] read it. ” —Harrisburg Patriot-News
“ This cautionary tale should be required reading for all those tempted by the calling cards of easy money and precarious peace of mind. ” —Tom Brokaw
“ A page-turner . . . McGraw brings us to the front lines of the U.S. energy revolution to deliver an honest and humbling account that could hardly possess greater relevance. ” —The Humanist
How Fracking Ignited the American Energy Revolution and Changed the World: A History from the First Discovery to the Tapping of the Marcellus Shale, 2d ed.

Vision for the Future
Environmental Considerations Associated with Hydraulic Fracturing Operations
Hydraulic Fracturing for Oil and Gas
Monetizing Natural Gas in the New “ New Deal ” Economy
Hearing Before the Committee on Energy and Natural Resources, United States Senate, One Hundred Twelfth Congress, First Session, to Consider Market Developments for U.S. Natural Gas, Including the Approval Process and Potential for Liquefied Natural Gas Exports, November 8, 2011

Fracking - hydraulic fracturing of porous rock to enhance the extraction of fossil fuels - was first attempted in the mid-20th century, but has only recently been adopted as a viable source of hydrocarbons. This volume in the Issues series examines the technology, and its potential environmental implications. This final report provides a review and synthesis of available scientific information concerning the relationship between hydraulic fracturing activities and drinking water resources in the United States. The report is organized around activities in the hydraulic fracturing water cycle and their potential to impact drinking water resources. The stages include: (1) acquiring water to be used for hydraulic fracturing (Water Acquisition), (2) mixing the water with chemical additives to prepare hydraulic fracturing fluids (Chemical Mixing), (3) injecting the hydraulic fracturing fluids into the production well to create fractures in the targeted production zone (Well Injection), (4) collecting the wastewater that returns through the well after injection (Produced Water Handling), and (5) managing the wastewater via disposal or reuse methods (Wastewater Disposal and Reuse). EPA found scientific evidence that hydraulic fracturing activities can impact drinking water resources under some circumstances. The report identifies certain conditions under which impacts from hydraulic fracturing activities can be more frequent or severe.

The large scale, practical uses of natural gas were initially introduced by innovators Joseph Pew and George Westinghouse for the steel and glass industries in Pittsburgh, and local gas companies

evolved from individual wells to an interstate supply network acquired by Rockefeller’s Standard Oil interests. Natural gas is now a prevalent part of American markets and with the production from the Marcellus shale is filling the critical void left by a lack of new coal, oil, and nuclear power facilities. This vital American enterprise began in the Appalachian states as an accidental and underestimated byproduct of the oil rush of 1859. This book explores the evolution and significance of the natural gas industry to the present day. After 20 years at different positions in the gas sector, from the policy side to trading floors, the author gives an overview of the major gas issues and elaborates on the consequences of the US shale gas revolution. The first part of the book provides basic knowledge and gives needed tools to better understand this industry, that often stands, in sandwich, between upstream oil and utilities. After extensive research, publication and teaching, the author shares his insights on fundamental issues all along the gas chain and explains the price mechanisms ranging from oil-indexation to spot. The second part looks into the future of worldwide gas balance. To supply growing markets, the major resource holder, Russia, is now in direct competition with the major gas producer, the US. China has the potential not only to select the winner but also to decide the pricing principle for all Asian buyers in 2020. As China is a new and growing gas importer and has a lower price tolerance than historical Asian buyers (Japan and South Korea), it is highly possible that, against basic geography, China selects waterborne US LNG versus close Russian pipe gas, to achieve lower import price. Europe, so risk adverse that it won't be able to take any decision regarding shale gas production on this side of 2020, should see its power fading on the energy scene and would rely more on Russia. Gas geopolitics could tighten Russia stronghold on Europe, on one side, and create a flourishing North America-Asian trade... This book is accessible to ail and will particularly interest readers seeking a global gas perspective where economics and geopolitics mix. It can be read as an economic novel where billions of \$ are invested to shape tomorrow energy world or as a geopolitical thriller where Russia and the US compete to impose their respective agenda, leaving China tn select the winner.

Shale Gas and Tight Oil Reservoir Simulation Assisted History Matching for Unconventional Reservoirs
How Fracking's False Promise of Plenty Imperils Our Future
Shale Gas Development

The Natural Gas Industry in Appalachia: Issues, Potentials, and Policy Implications
A pharmacologist and a veterinarian pull back the curtain on the human and animal health effects of hydraulic fracturing, or “fracking”
Across the country, fracking—the extraction of natural gas by hydraulic fracturing—is being touted as the nation’s answer to energy independence and a fix for a flagging economy. Drilling companies assure us that the process is safe, politicians push through drilling legislation without a serious public-health

debate, and those who speak out are marginalized, their silence purchased by gas companies and their warnings about the dangers of fracking stifled. *The Real Cost of Fracking* pulls back the curtain on how this toxic process endangers the environment and harms people, pets, and livestock. Michelle Bamberger, a veterinarian, and Robert Oswald, a pharmacologist, combine their expertise to show how contamination at drilling sites translates into ill health and heartbreak for families and their animals. By giving voice to the people at ground zero of the fracking debate, the authors vividly illustrate the consequences of fracking and issue an urgent warning to all of us: fracking poses a dire threat to the air we breathe, the water we drink, and even our food supply. Bamberger and Oswald reveal the harrowing experiences of small farmers who have lost their animals, their livelihoods, and their peace of mind, and of rural families whose property values have plummeted as their towns have been invaded by drillers. At the same time, these stories give us hope, as people band together to help one another and courageously fight to reclaim their communities. The debate over fracking speaks to a core dilemma of contemporary life: we require energy to live with modern conveniences, but what degree of environmental degradation, health risks, and threats to our food supply are we willing to accept to obtain that energy? As these stories demonstrate, the stakes couldn't be higher, and this is an issue that none of us can afford to ignore.

According to Department of Energy (DOE) and industry expectations, in the next few years the United States is expected to change from a net importer of natural gas to a net exporter, with those exports destined for different regions of the world, especially Asia. More than 30 companies have received approval from DOE for large-scale exports of U.S. liquefied natural gas (LNG)--natural gas cooled for transportation--beginning in 2015 or 2016 via specialized LNG carriers. Congress is considering whether to propose legislative language that would require U.S. LNG be exported via U.S.-built-and-flagged carriers with the goal of supporting U.S. shipbuilders and mariners. This book discusses DOE and industry expectations for the market for U.S. LNG exports and how the proposed requirement could affect jobs in the U.S. maritime industry and the broader U.S. economy.

A Pulitzer Prize finalist presents an

unstinting exploration of today's controversial fracking technologies to consider the arguments of its supporters and detractors, profiling key contributors while explaining how the practice is changing the way energy is used.

"A lively, exciting, and definitely thought-provoking book." —Booklist Things looked grim for American energy in 2006, but a handful of wildcatters were determined to tap massive deposits of oil and gas that giants like Exxon and Chevron had ignored. They risked everything on a new process called fracking. Within a few years, they solved America's dependence on imported energy, triggered a global environmental controversy, and made and lost astonishing fortunes. No one understands the frackers—their ambitions, personalities, and foibles—better than Wall Street Journal reporter Gregory Zuckerman. His exclusive access drives this dramatic narrative, which stretches from North Dakota to Texas to Wall Street.

Adjusting to the Shale Revolution in a Green World

U.S. Liquefied Natural Gas Exports How America's Shale Gas Boom Is Threatening Our Families, Pets, and Food Snake Oil Natural Gas Shale Gas

The Science Behind the Controversy This brief explores the business and global implications of the American shale energy, or natural gas, revolution. Specifically, it provides a rational, comprehensive look at the major business themes and management implications that surround the new abundance of natural gas in the United States and identifies some of the most significant geopolitical considerations globally. While acknowledging some of the controversies and hazards surrounding the extraction techniques, commonly known as "fracking", the author also looks at the hopes this technique poses and details how shale energy will impact supply chains for firms. The discovery of new sources of domestic natural gas in recent years - coupled with innovations that facilitated their extraction - has altered the global landscape. However, the vast majority of the information out there for business students, faculty, and practitioners about the natural gas revolution is focused on the impact of "longer and lower" energy prices; and, secondarily, opportunities within the domestic energy sector. Each of these is crucial for business people to understand, however, the natural gas revolution is about much more. Companies of all sizes, whether they see it or not, are having new opportunities open up for their products and services. Further, the globalization of shale energy will have far reaching influence beyond

simply economic factors. Geopolitical considerations and the re-structuring of international relations around shale energy will impact supply chains in a myriad of ways. This book aims to examine these opportunities. Featuring case studies from contemporary companies, this book will be of interest to students, academics, researchers, professionals and policy makers who are seeking to understand the business and global implications of the shale energy revolution.

In *Under the Surface*, Tom Wilber weaves a narrative tracing the consequences of shale gas development in northeast Pennsylvania and central New York through the perspective of various stakeholders. Wilber's evenhanded treatment explains how the revolutionary process of fracking has changed both access to our domestic energy reserves and the lives of people living over them. He gives a voice to all constituencies, including farmers and landowners tempted by the prospects of wealth but wary of the consequences; policymakers struggling with divisive issues concerning free enterprise, ecology, and public health; and activists coordinating campaigns based on their respective visions of economic salvation and environmental ruin. For the paperback edition, Wilber has written a new chapter and epilogue covering developments since the book's initial publication in 2012. Chief among these are the home rule movement and accompanying social and legal events leading up to an unprecedented ban of fracking in New York state, and the outcome of the federal EPA's investigation of water pollution just across the state border in Dimock, Pennsylvania. The industry, with powerful political allies, effectively challenged the federal government's attempts to intervene in drilling communities in Pennsylvania, Wyoming, and Texas with water problems. But it met its match in a grassroots movement—known as "fractivism"—that sprouted from seeds sown in upstate New York community halls and grew into one of the state's most influential environmental movements since Love Canal. Throughout the book, Wilber illustrates otherwise dense policy and legal issues in human terms and shows how ordinary people can affect extraordinary events.

The Congressional Record is the official record of the proceedings and debates of the United States Congress. It is published daily when Congress is in session. The Congressional Record began publication in 1873. Debates for sessions prior to 1873 are recorded in *The Debates and Proceedings in the Congress of the United States (1789-1824)*, *The Register of Debates in Congress (1824-1837)*, and *The Congressional Globe (1833-1873)*. Natural gas markets have undergone momentous changes, worldwide. This book updates and expands on the dynamics, performance and forward path of expanding natural gas use in the US and worldwide, including international trade. It brings together

major research themes and findings with recent updates and analysis of new trends and developments. It also explores many considerations for natural gas market development, such as the importance of infrastructure, transparent pricing, and institutional capacity. This book is unique in providing background on the full natural gas value chain as well as information and analysis that can foster scenario-building and decision-making. Of particular value are the lessons learned and demonstrated for those countries that aspire to build effective natural gas markets and to expand natural gas development and use.

Risk, Impacts, and Protest Against Hydraulic Fracking in U.S. Shale Regions

Shale Gas and Fracking

Proceedings and Debates of the ... Congress

The End of Country

Commodities at a Glance

Fractured Communities

Historical Dictionary of the Petroleum Industry

The climate of our planet is changing at a rate unprecedented in recent human history. The energy absorbed from the sun exceeds what is returned to space. The planet as a whole is gaining energy. The heat content of the ocean is increasing; the surface and atmosphere are warming; mid-latitude glaciers are melting; sea level is rising. The Arctic Ocean is losing its ice cover. None of these assertions are based on theory but on hard scientific fact. Given the science-heavy nature of climate change, debates and discussions have not played as big a role in the public sphere as they should, and instead are relegated to often misinformed political discussions and inaccessible scientific conferences. Michael B. McElroy, an eminent Harvard scholar of environmental studies, combines both his research chops and pedagogical expertise to present a book that will appeal to the lay reader but still be grounded in scientific fact. In *Energy and Climate: Vision for the Future*, McElroy provides a broad and comprehensive introduction to the issue of energy and climate change intended to be accessible for the general reader. The book includes chapters on energy basics, a discussion of the contemporary energy systems of the US and China, and two chapters that engage the debate regarding climate change. The perspective is global but with a specific focus on the US and China recognizing the critical role these countries must play in addressing the challenge of global climate change. The book concludes with a discussion of initiatives now underway to at least reduce the rate of increase of greenhouse gas emissions, together with a vision for a low carbon energy future that could in principle minimize the long-term impact of energy systems on global climate.

Shale Gas and Tight Oil Reservoir Simulation delivers the latest research and applications used to better manage and interpret simulating production from shale gas and tight oil reservoirs. Starting with basic fundamentals, the book then includes real field data that will not only generate reliable reserve estimation, but also predict the effective range of reservoir and fracture properties through multiple history matching solutions. Also included are new insights into the numerical modelling of

CO₂ injection for enhanced oil recovery in tight oil reservoirs. This information is critical for a better understanding of the impacts of key reservoir properties and complex fractures. Models the well performance of shale gas and tight oil reservoirs with complex fracture geometries Teaches how to perform sensitivity studies, history matching, production forecasts, and economic optimization for shale-gas and tight-oil reservoirs Helps readers investigate data mining techniques, including the introduction of nonparametric smoothing models Reveals how gas resources are transforming the global energy industry, explaining the key technologies, identifying nations and regions that may achieve unexpected energy independence, and the environmental risks.

While environmental disputes and conflicts over fossil fuel extraction have grown in recent years, few issues have been as contentious in the twenty-first century as those surrounding the impacts of unconventional natural gas and oil development using hydraulic drilling and fracturing techniques—more commonly known as “fracking”—on local communities. In *Fractured Communities*, Anthony E. Ladd and other leading environmental sociologists present a set of crucial case studies analyzing the differential risk perceptions, socio-environmental impacts, and mobilization of citizen protest (or quiescence) surrounding unconventional energy development and hydraulic fracking in a number of key U.S. shale regions. *Fractured Communities* reveals how this contested terrain is expanding, pushing the issue of fracking into the mainstream of the American political arena.

Oil and Gas Production Handbook: An

Introduction to Oil and Gas Production

Shale Oil and Gas

Fracking

Chronologies, Top Ten Lists, and Word Clouds

American Shale Energy and the Global Economy

The Frackers

Employment Impacts of Upstream Oil and Gas

Investment in the United States

What energy sources to use and how to ensure their availability is one of the most fundamental policy questions facing human societies today. The choices have many global dimensions and implications, from the geopolitics of energy markets, to energy prices, to the emissions from energy systems and their environmental impacts, including climate change. This book explores in depth the full range of these issues, giving a comprehensive, but relatively concise, account of the energy issues, options and choices that face all countries, and plotting out different potential energy paths with very different technological profiles and implications for energy security and environmental change. The book concludes with a review of the policies that countries can use in order to influence the way their energy system develops over the crucial decades between now and 2050.

Since the first edition of *Fracking* was published, hydraulic fracturing has continued to be hotly debated. Credited with bringing the US and other countries closer to “energy independence,” and blamed for tainted drinking water and earthquakes, hydraulic fracturing (“fracking”) continues to be one of the hottest topics and fiercely debated issues in the energy industry and in politics. Covering all of the latest advances in fracking

since the first edition was published, this expanded and updated revision still contains all of the valuable original content for the engineer or layperson to understand the technology and its ramifications. Useful not only as a tool for the practicing engineer solve day-to-day problems that come with working in hydraulic fracturing, it is also a wealth of information covering the possible downsides of what many consider to be a very valuable practice. Many others consider it dangerous, and it is important to see both sides of the argument, from an apolitical, logical standpoint. While induced hydraulic fracturing utilizes many different engineering disciplines, this book explains these concepts in an easy to understand format. The primary use of this book shall be to increase the awareness of a new and emerging technology and what the various ramifications can be. The reader shall be exposed to many engineering concepts and terms. All of these ideas and practices shall be explained within the body. A science or engineering background is not required. *Business and Geopolitical Implications of the Fracking Revolution* *Expectations and Potential Effects* *The Boom* *From Rich Rock, Unconventional Ideas and Unwavering Determination to a Renewed World Energy Future* *Handbook of Energy* *Further Investigations into the Environmental Considerations and Operations of Hydraulic Fracturing* *The Role of Oil and Gas Companies in the Energy Transition*