Natural Gas-Fuel for the 21st Century

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Published in:
Energy journal

Although the book is mixed from an economic point of view, the volume provides valuable detailed material for researchers interested in U.S. shale gas policy especially in the Marcellus (see the chapters by Spence, Goldstein, Brown, and Kristl) or comparative institutional economics for development (see the chapters by Morgan, Glazewski, and Daya-Winterbottom). The negative conclusions in the final chapter are disheartening. It seems that shale gas is not the future of energy—at least not until individual, corporate, national, and international goals are realigned to conform with a vision of sustainable development.

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Natural Gas—Fuel for the 21st Century, by VACLAV SMIL (Chichester, UK: Wiley, 2015), 264 pages. ISBN 978-1-119-01286-3. E-book ISBN: 978-1-119-01284-9.

This book by the famous professor emeritus of the University of Manitoba in Canada, his 36th, is devoted to natural gas. It is a concise review of several aspects of the supply of natural gas. It starts with the biogenic origins and shows the geological and geographical concentrations. Then, it provides an overview of the basic extracting, processing, transporting, and storing operations. Apart from conventional natural gas, there is a clear exposition of the nonconventionals (shale gas, gas from tight sand, and coal-bed methane) and a critical reflection regarding the – often overly optimistic – industry prospects. Smil provides an account of the industrial uses of natural gas and its role in heating, cooling and cooking. Here, the importance of natural gas for electricity generation is highlighted, as is its usage in chemical industries. Then Smil goes into the internationalization of natural gas. He highlights the recent boom in liquid natural gas shipments. The role of international politics, especially related to the conflicts of interest between Russia, China, and the U.S. are highlighted from the U.S. perspective. These six chapters lay the foundation for the reflections in Chapters 7 and 8 about the future role of natural gas. Chapter 7 covers the potential role for natural gas in energy transitions. Here, Smil relates to the fact that the world derived 88% of its primary commercial energy from fossil fuels in 1990 and it stood at 87% in 2012. From this, he concludes that the transition is likely to be very slow which would offer considerable potential for natural gas. But Smil also lists some of the drawbacks of a larger role for natural gas, especially flaring, methane releases, water use and contamination, and earthquakes. The title of the last chapter reads 'The best fuel for the twenty-first century?'. In this respect, Smil concludes that natural gas is an excellent fossil fuel whose many inherent advantages could contribute to its increasing use.

The book is well-referenced and provides a *tour d'horizon* of natural gas. It especially focuses on energy technologies and the supply side of natural gas. This is done in the first six chapters of the book which are highly informative for the non-energy expert. The last two chapters are much more speculative as they regard the potential role for natural gas in the transformation of energy systems and the assessment of what would be the best fuel for the twenty-first century. Nevertheless, they are highly interesting and very welcome as such a forward-looking perspective regarding the spread of natural gas also relates to an issue that is decisive for the fate of our society,

namely climate change. Direct or indirect anthropogenic release of greenhouse gases significantly contributes to climate changes. Substituting a 'dirty' fuel, such as coal, with a less-dirty fuel like natural gas may affect the growth rate of greenhouse gas emissions, but will not stop such growth. But the issue of avoiding the release of these emissions in the atmosphere is only very briefly touched upon in the book when carbon capture and storage techniques are discussed. The book does not discuss how a lower concentration of anthropogenic greenhouse gases in the atmosphere can be achieved. Climate change as such is not even included as a lemma in the index. It would be very interesting to read Smil's views about how the fossil fuel industry should effectively manage the external effects of their operations.

Smil is optimistic about the role of natural gas and argues it may complement or even substitute for coal and oil regarding a large number of applications. He also assumes that the dominance of fossil sources is here to stay as he qualifies society as a fossil-fueled civilization. This indeed has been the case since the mid-1850s until current times. However, he does not show that there is something inherent to human civilization that would warrant such qualification. Further, Smil does not acknowledge that previous transformations of the energy system have occurred within a few decades and that some countries (e.g. China, Germany) underwent enormous changes within one decade, which would shed some doubt on the book's claims regarding the prospective role of natural gas. I feel the weakest part of the book is that it seems to ignore social and economic relations: it does not address the role of markets, ambitions and market power of incumbents, changes in the demand side, the role of taste, or politics. This backfires in the last chapter which lacks an analytical framework to arrive at a well-grounded answer to the question what is the best fuel for the 21st century. Let us hope Smil will take this up in one of his next books.

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U.S. Energy Tax Policy edited by GILBERT E. METCALF (Cambridge, Cambridge University Press, 2014), 401 pages. Hardback ISBN 978-0-521-19668-0.

The papers included in this book were presented at a conference held in Washington, D.C., on October 15 and 16, 2009 and the unifying theme is the American Clean Energy and Security Act of 2009 (H.R. 2454), also known as the Waxman-Markey bill. The latter was the first attempt by U.S. lawmakers to regulate greenhouse gas (GHG) emissions on the base of a cap-and-trade market mechanism. The bill was approved by the House of Representatives in June 2009 and the timing of the conference was very appropriate. However, the bill never reached the Senate floor. Nonetheless, the issues that were addressed are still relevant today in light of the initiatives that have been launched, particularly in the electricity sector, and of the U.S. government commitments taken at the United Nations meeting on global warming held in Paris in December 2015.

The first chapter is an introduction written by G. E. Metcalf who presents the topics that are developed in the following nine chapters. Most chapters include comments provided by a university, a government or a center expert in the specific domain. Each chapter is self-contained. It provides the policy relevance of the particular topic, a literature review, the description of the model underlying the analysis and a comprehensive discussion of the results by making use of tables and diagrams. More technical materials appear in appendices. The presentation in each chapter is organized in such a way that policy analysts, researchers and graduate students can easily find the materials that correspond to their specific needs.

It is generally acknowledged that the introduction of carbon pricing will have a regressive impact on final energy consumers. This regressive impact can be made worse by grandfathering