

## BOOK REVIEWS

***LNG: Fuel for a Changing World—A Nontechnical Guide, 2<sup>nd</sup> edition***, by MICHAEL D. TUSIANI and GORDON SHEARER. (Penwell Corp., 2016) 600 pages, ISBN-13: 978-1593703691; ISBN-10: 1593703694. Hardcover.

This is an immensely useful book for those who want to get more deeply involved in the commercial detail of the LNG space. It is not an academic book (and does not pretend to be) but rather, as the title suggests, a guide. Those not familiar with LNG may find the term “non-technical” slightly misleading given the considerable and necessary volume of well-explained detail of the hardware involved in the LNG chain. A main driver for this publication is to replace the first edition published in 2007, but time has not been kind to the text, which appears to have been finished at the start of 2015. This means that most of the data are from 2012/13 and events in the LNG world have moved on considerably since the text was completed.

There are 19 chapters of which the first six deal with: regional markets, business models and projects, serving as an introduction for those not familiar with the industry. The value for those seeking detail are in the following sections on overall economics and the segments of the value chain: upstream, liquefaction, tankers and import terminals. These are followed by commercial/legal/regulatory chapters on: project formation, upstream agreements, sale and purchase agreements, tanker contracts, shipping regulations, terminal siting, and terminal use agreements. The chapters are intended to read as discrete units which creates the problem of a significant amount of repetition for those reading sequentially.

The authors have worked for most of their careers for Poten and Partners—a well-known and highly regarded gas and LNG consultancy—which provides reports and data services to the commercial community. On the one hand, this has given them substantial commercial insights and access to confidential commercial data which are rare in academic books on the gas industry. On the other hand, the book is dominated by data drawn from the company’s proprietary services which cannot be accessed by readers, and could be interpreted as advertising. Many chapters are based very substantially on these sources, whereas comparisons of Poten data with public domain information (from GIIGNL, IEA, IGU and Cedigaz) would have been useful.

The timing of the book is important as for many decades, the LNG business was a “. . . community held together by long-standing relationships between limited numbers of counter-parties. The result was a small, exclusive club of participants that included state-owned national oil companies, utilities and energy majors” (p.148). From 2014–20, LNG trade is projected to expand by around 50% with what the authors describe as “the Australian era” (post 2013) and “the US gamechanger” (2020 and beyond) as the key developments. This period is seeing a very substantial expansion of participants and the transformation of LNG into a global market. This trend is being assisted by the development of floating liquefaction (FLNG) and regasification (FSRU) technology. The former allows stranded reserves far from markets to be commercialised, and the latter hugely reduces the lead time for gas to be introduced into a market from 4–5 years for an on-land regasification terminal to a year or less (if a FSRU vessel is available).

As we progress through the 2010s, the paradigm of LNG trade is changing—and in liberalised markets has already changed—from a relatively inflexible “floating pipeline” to a network model which features much greater flexibility in shipping and import terminals, resulting in cargo deliveries being switched to the most profitable market. This requires contractual changes of which the most important is the change to destination flexibility, achieved in the majority of Atlantic Basin contract following EU anti-trust decisions at the beginning of the 2000s, but still a feature of many

long term LNG contracts in the Pacific, and increasingly controversial given the commercial importance of cargo diversion.

This links to changes in long term contract pricing and the growth of spot trading, particularly during the 2010s. This trend was accelerated by the signing of the first U.S. LNG export contracts at the start of the decade—although the first cargos flowed only in 2016—because of the revolutionary (for LNG) contract and pricing structure. Chapter 14 takes the reader through the traditional long term LNG contract with oil-indexed prices, to the development of hubs in North America and Europe, and the new tolling contracts for U.S. exports from the Gulf Coast. The pricing structure of the latter—Henry Hub  $\times$  1.15 + liquefaction fee (mostly \$3.00–3.50/MMbtu) looked extremely attractive against oil-linked priced contracts in the Pacific when oil was at \$100/bbl. But at oil prices significantly below \$60/bbl, U.S. LNG offtakers will struggle to recover the full cost of cargos even with Henry Hub prices around \$2.50/MMbtu, and this could create severe financial strains as the majority of projects come on stream during 2018–20, and could constrain future expansion of U.S. LNG exports.

However, U.S. offtakers may be in a better position than investors in the giant Australian LNG export projects which are coming on stream in the mid to late 2010s, most of which are substantially over budget and needing Asian prices as high as \$15–16/MMbtu to break even (p.63), compared with 2016 levels of around half those figures. These oil-indexed contracts present substantial challenges for both sellers and buyers: sellers needing an oil price approaching \$100/bbl to make a return on investment; buyers seeking to convert oil-indexed prices to spot or hub prices to ensure they more closely approximate to current market conditions.

The authors' conclusion that:

“The high cost of liquefaction, shipping and regasification will not change, and the established LNG supply contracts and their legacy pricing will not disappear overnight. Key markets such as Japan will continue to seek supply security and thus follow the more classic utility model even as Japanese buyers seek to build supply portfolios with diversified pricing terms...It is unclear if and where a benchmark price would appear in Asia, reducing motivation on the part of legacy sellers or buyers to change the status quo.” (p.555)

might be different if they were writing today. Affordability of LNG has become a key issue if gas is to compete with coal and renewables in new and established markets. This will require substantial cost reduction and adjustment of contracts to market conditions. Even in established markets such as Japan, gas and power liberalisation is ongoing and the oil-indexed long term contract model is being replaced by shorter term contracts with hybrid pricing. Overall, LNG trade is undergoing a transition from a regionally based and inflexible, to a more global and market driven, model and will need to progress further in this direction if it is to have a bright future.

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***A Handbook of Primary Commodities in the Global Economy, 2<sup>nd</sup> edition***, by MARIAN RADETZKI and LINDA WÅRELL (Cambridge, Cambridge University Press, 2016), 305 pages, ISBN 978-1-107-12980-1

Marian Radetzki presented us with his first Guide to Primary Commodities in 1990, published by Blackwell. The book did not have wide circulation, probably because of the commodity doldrums around that time. The first edition of this Handbook, under a new publisher, was published in 2008, in the midst of a commodity boom. The Introduction of this second edition motivates the update through the number of “exciting stories” that have emerged in commodity markets since 2008. These include the recent dominance of China as a commodity consumer, the growth of com-

modity exchanges and price transparency, the rise of resource nationalism, and the emergence of shale oil and shale gas and the resultant new perspective on sustainability and depletion. The book covers much of the same ground as the previous edition, which I reviewed in 2009 (Davis, 2009), but with a new chapter on fossil fuels and appropriately updated discussions of the major components in the previous edition given how commodity markets have changed over the past decade.

In this edition Radetzki, in his words “having reached an impressive age,” teams up with Luleå colleague, Associate Professor of Economics Linda Wårell. Wårell is also Editor-in-Chief of *Mineral Economics*. Neither Radetzki nor Wårell will be familiar names to energy economists, each author having spent most of their career on the minerals markets. I can assure readers that Radetzki is a legend in mineral economics, with the usual clear thinking that decades of experience brings. The addition of Wårell to this edition is unobtrusive, and I can’t say that I can see where one author leaves off and the other begins in any given chapter.

The book, as with its previous edition, offers a comprehensive survey of commodity markets aimed at the generalist reader. It is free from technical jargon, though the thoughts and analysis clearly come from Radetzki and Wårell’s training as economists. Commodity markets here include energy, minerals and agriculture, but exclude electricity. The weight of the discussion is on minerals markets, with which these authors are most familiar, but there is adequate attention to food, agricultural raw materials, and energy.

Unlike surveys or annual reviews that are collections of papers, the book is put together to be read from cover to cover. Later chapters often mention and build on material presented in earlier chapters, and some topics, like the resource curse, are dealt with in parts in different chapters.

The book begins with a brief introductory chapter outlining the historical framework for commodity markets, ranging from production data in the 1880s to the decline of transport costs and the consequent globalization of commodity markets. It then devotes chapters on the geography of production and comparative advantage and trade, for if an economist wants to understand a market they must understand why production is located where it is and what motivates subsequent trade in the product. The fourth chapter, on fossil fuels, is the only one to focus on a particular commodity set. The authors give three reasons for a special focus on fuels: the heavy dominance of energy raw materials in world commodity markets; the worries of energy scarcity and energy security that continue to pervade the political landscape; and the fundamental changes in oil and gas production technologies that promise to replace scarcity with abundance.

The material in the fossil fuels chapter mainly seeks to explain the incredible rise of oil and gas prices from 1970 to 2013. Over that period real oil prices rose by 870% and gas rose by 405%. In what is likely to be a controversial position in some circles, Radetzki and Wårell dismiss demand-side influences, as well as the oil cartel, as having any major role in the rise. Instead, they see inadequate investment combined with asset mismanagement in several of the main oil producing nations as the culprit. By their analysis, world oil production in 2014 could have been at least 20 million barrels per day higher but for the negative effects of the resource curse on the production of oil rich nations. This shortfall in production, in their view, explains the price rise. Going forward they see the world awash in oil and gas due to the advent of fracking, not only as it is applied to gas recovery, but also to oil recovery. They predict \$2.5 for a million British thermal units of gas and \$40/barrel oil over the next two decades. They see no reasonable prospect for a coordinated global climate policy in the near future that could raise energy prices for consumers, and thus predict a continued expansion of oil and gas usage at the expense of coal and renewable energy.

After setting up in Chapter 5 how prices are formed by supply and demand influences, Chapter 6 recounts the story of three commodity booms, the first starting in 1949, the second in 1973, and the third in 2004. All three booms are deemed to be demand driven, somewhat in conflict with the emphasis in the fossil fuels chapter on supply weakness as the cause of the long-run rise in energy prices.

When I assigned this book as part of the reading list in my graduate mineral and energy economics class last semester, the 7<sup>th</sup> chapter, The Commodity Exchanges, Commodity Investment, and Speculation was the one that students found most interesting. As the chapter title suggests, it covers the interesting nexus of physical and financial commodity trade. The chapter is more descriptive and less analytic than the other chapters in the book, no doubt because the authors are not specialists in the topic. Radetzki and Wårell do, in the course of the chapter, take time to review the literature on speculation and its impacts on market movements, coming to the reasonable conclusion that “speculators and other financial investors are not to blame for accentuated price volatility and bubbles in commodity prices.”

Chapter 8 reviews resource economists’ bread and butter, sustainability and resource depletion. My students also found this chapter fascinating, being new to the field and coming to it with their societal predisposition that we must be running out of everything that is not renewable. Radetzki and Wårell methodically go through the standard indicators of resource depletion and what their trends over time are revealing. “We conclude that the evidence for depletion is fuzzy and inconclusive, but if anything, it points to relative relaxation of scarcity over the course of the twentieth century.” They agree with my colleague, John Tilton, that the saving grace has been cost-reducing technological progress in finding and exploiting exhaustible resources. My students were both convinced and relieved by this outcome, as non-specialists have come to understand the world as continually on the verge of collapse due to resource exhaustion. We may indeed be on the verge of collapse, but this is due to environmental exhaustion, the result of having too much access to fossil fuels. The authors say very little on this last point, obviously having the goal of staying within the bounds of the book’s title (neither climate change nor global warming show up in the book’s Index). Nevertheless, a chapter on sustainability should surely include a nod to the environmental sustainability of the continued fossil fuel production and use that the authors suggest will keep energy price rises at bay for at least another two decades.

The ninth chapter takes a moment to discuss importing nations’ quest for materials independence. Unlike most economists who decry any policy aimed at costly efforts to increase domestic production and inventory, Radetzki and Wårell allow that the lack of severe global supply crises in the past provides no guarantee that they will not happen in the future. Then, “even the more costly among the measures in the present chapter might emerge as highly worthwhile.” I must admit I liked the analysis of energy security in Jim Griffin’s (2009) *A Smart Energy Policy* more than I liked this chapter because of Griffin’s more extensive attention to policy details in the event that a country does want to counteract the natural and inevitable tendency of markets to want to specialize and trade.

Chapter 10 reviews the history of the many producer cartels over both mineral and energy production. It only devotes three pages to OPEC, due to its “impotence.” As noted in Chapter 4, Radetzki and Wårell credit the production restrictions in the OPEC countries since the early 1970s to the inefficiencies of state ownership and underinvestment as a result of the resource curse, and not to any collective strategy.

Chapter 11 reviews and explains the different levels of state ownership of production across different commodities. The chapter sticks to economic considerations and outcomes, whereas there is a considerable political economy literature on this same topic. It also misses the recent move to the left in Latin America and the consequent expropriations of several large mineral and energy deposits.

Chapter 12, the final chapter, moves back into development economics, discussing the fate of the monoeconomies. It is here that the only discussion of fiscal systems is found, along with Dutch Disease and more on the resource curse. In the end Radetzki and Wårell argue against forced diversification of an economy that is heavily dependent on mineral or energy production. I must say this is reassuring, as the authors clearly believe in a resource curse, and diversification is the usual, and in my opinion disastrous, policy prescription for that.

In this second edition Radetzki and Wårell have admirably update their outstanding survey volume on commodity markets. It is just as comprehensive as before, though appropriately taking into account changes in the market since the last edition. At a meagre 286 pages of text, I know of no better, concise, single source for generalists and even non-academic resource and energy economists to be able understand historical and current issues in the global market for commodities. In fact, I would say that for folks who want to make a career out of commodity market analysis this is a must read. Those of us who specialize in the mineral and energy economics will certainly find portions of the book frustrating due to superficial treatment of subjects we think require deeper analysis. We will also disagree with broad conclusions, on occasion. The index is not as comprehensive as I would like, and in some cases directs the reader to the wrong section of the book. There is also no author index, and so one cannot look up a particular reference to see where it is dealt with in the text. Given the rising importance of China in all commodity markets a separate chapter on China would have been warranted. As it is there are about a dozen pages devoted to China, but these are scattered throughout the book.

Because commodity markets are continually changing at such a fast pace, certain of the data and concepts in this book will soon be outdated. It is unlikely that Marian Radetzki will want to write a 3<sup>rd</sup> edition down the road, as he turns 80 this year. But for now, we can be thankful for his and Linda's efforts on this second edition, which should be a part of any practicing resource and energy economist's library.

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## REFERENCES

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***Energy Security, Trade, and the EU: Regional and International Perspectives***, by RAPHAEL LEAL-ARCAS, COSTANTINO GRASSO, and JUAN ALEMANY RÍOS, (Northampton, MA: Edward Elgar Publishing, 2016), 488 pages, ISBN-13: 978-1785366734.

Raphael Leal-Arcas, Costantino Grasso, and Juan Alemany Ríos have produced a fascinating examination of the European Union (EU), weaving together an interdisciplinary and well-researched text about the origins of its energy security framework, as well as its future aspirations. This text is primarily an analysis of the legal framework, or governance, surrounding EU energy security, and trade, as well as practical policy advice to enhance energy security for the entire European Union.

The utilization of a legal framework is the most distinctive point to appreciate about this text, since this is an approach not seen elsewhere in the literature on energy security. The authors adopt a legal framework not only for their energy security analysis, but also for their subsequent policy recommendations, which is meant to be a way forward that allows the development of energy governance on a larger scale, facilitating everything from the unhindered movement of supplies to creating the right ecosystem for renewables to flourish. As a result, this is an in-depth review of the multilateral, bilateral, and intra-EU energy and trade frameworks that underlie regional and global energy governance, which have an impact on EU energy security.



At first glance, especially to those of us that are used to approaching energy security from a security or political point of view, the scope of this text may seem prohibitively restrictive for something as expansive as energy security, especially given the focus on the European Union at the supranational level. But, the authors do successfully intertwine other key issues with the legal concerns.

The book has seven chapters. Chapter One gives an overview and outlines the background for energy policy within the EU. The authors argue that historically there has been no common energy policy at the EU level, which changed with the Lisbon Treaty in 2009. They note the strong dependence on energy imports and the resulting insecurity with the stated goal of how to promote energy security through trade, comprehensive governance, and further EU energy market integration. They mention issues with Russia right in the beginning, starting the chapter with “two facts,” which involve a high level of EU import dependency and a strong reliance on Russian natural gas. This of course presents a problem. Relations with many external suppliers, particularly relations between the EU and Russia, will primarily be handled politically and economically, so their bureaucratic approach is at times constrained. The authors do not attempt to dispel the notion that energy security issues remain political in nature. Rather, they focus on the efficiencies to be had by added energy legal frameworks at varying levels of governance and as a tool to further develop markets and integration. So, when confronted with an EU that cannot compel Russia to keep gas flowing to Europe via transit agreements running through Ukraine, the text seamlessly resorts to more traditional energy security drivers.

Chapter Two essentially argues that the regional and global governance of energy is fragmented, and lacks a unified structure. They proceed to itemize all possible economic agreements that could have some impact on energy governance and arrive at the conclusion there are serious deficiencies in these mostly trade related agreements that do not properly address energy governance and security issues. For example, since the stalled partnership and cooperation agreement (PCA) between Russia and the EU has not accomplished much, the authors suggest it is appropriate to focus on extra-legal approaches to energy security. Their analysis is acute, helpful, and realistic, recognizing the PCA is stalled due primarily to politics on the periphery and the weakened EU bargaining position with Russia’s new gas market in China, leading them to focus on supplier diversification as well as advocacy for renewables investment and the exploitation of shale gas. The text rather shines where all these possible avenues, requiring agreements of some sort, are explored in order to determine ways to provide smooth operations and the efficient transfer of energy supplies through potential legal frameworks for infrastructure and supply agreements. Just as importantly, they demonstrate avenues of least resistance to such agreements as in reformulating existing bilateral trade deals to facilitate security in various forms.

Chapter Three moves from broad energy governance to specific transit agreements impacting the EU. They also further their case here for the Energy Charter Treaty (ECT), established in 1998, and is unique in that it is a multilateral legal instrument with aspirations to provide energy governance to the Eurasia region. They focus on this instrument in the chapter and relate its possibilities to existing transit agreements throughout the region.

Chapter Four provides an overview of the impact of unconventional fossil fuel sources and their specific impact on EU energy security. They argue Europe, being quite resistant to the global shale boom, cannot afford to let this opportunity in new sources and technologies pass them given their high levels of energy dependence, especially from Russia. They also claim that building on the ECT as an energy security framework is a useful approach to govern competitive, global energy markets.

Chapter Five explores ways to boost the growth of renewables in the EU through its myriad preferential trade agreements (PTAs). After reviewing the key PTAs between the EU and its partners, the authors find that only three agreements out of the 22 that include renewables provisions have legally binding mechanisms. They conclude an effective approach to furthering the growth

in renewables is to integrate them into such agreements which further aligns them with the global economy.

Chapter Six essentially argues one of the recurrent themes throughout the text, which is to increase the diversity of supply to the EU, and that this should be a high priority item in Brussels. This all has a direct focus on Russia in the text as well. They also have a robust discussion on the feasibility of an integrated EU energy market, which with further governance measures implemented, like the ECT, is a distinct possibility, raising such successes as Nord Pool. They also offer ideas for diversification, such as increasing liquid natural gas (LNG) imports given EU re-gas capacity is only 22% utilized, and alternative pipeline projects. They have a strong emphasis on diversification and analyze pragmatic approaches to the task by advising the unbridled expansion of diverse imports, even by individual member states, from sources including the United States and Iran. They also call for the construction of more LNG re-gas terminals to be “scattered” across the continent, and the construction of alternate pipelines like TAP, TANAP, Nabucco, South Stream, and Trans-Saharan, all which become more economically viable if the EU can create an integrated European Energy Union. To that effect, they recommend extending Energy Charter Treaty (ECT) membership to energy rich countries in the Middle East and Africa aiding in infrastructure creation to these regions.

Chapter Seven is the culmination of the approaches and governance modifications discussed throughout the text. The creation of an EU energy union with a focus on how effective trade policy can contribute to energy security is the focus. The unified presence of such a large energy market would bring benefits of its own, like strong competition to access such a large market. However, speaking as a single entity for optimal energy security is difficult, given the inherent need to reconcile EU supranational interests with the diverse interests of individual member-states. The authors have answers here as well. They generate an excellent approach to understanding optimal avenues for energy security expansion, which is to start small and local, and build up. By beginning with regional integration, in the fashion of the successful Nord Pool, within the EU and then building out, eventually linking together different regional markets once they have been established, it allows work towards a more regional and global framework while still maintaining the approach of local self-interest that is necessary in today’s political climate.

However, some of the intra-EU synchronization efforts may be more difficult in today’s political environment than the authors surmise. This text was most likely completed before the United Kingdom’s decision to leave the EU, and was certainly completed before the election of Donald Trump in the United States, and the increasing popularity of far-right parties like the Alternative for Germany (AfD), in Germany, and other movements epitomized by Marine Le Pen in France and Geert Wilders in the Netherlands, all which demonstrate the broader populist fracturing occurring throughout Europe. While the authors address difficulties pertaining to the aftermath of the financial crisis, there was not enough context addressing these newer developments. In other areas, they simply find energy to be a strong unifying source that can draw the union closer together, without stating why this wouldn’t have occurred already, given that on the matter of energy unification, the continent has had a protracted stretch of opportunity given its origins as the European Coal and Steel Community. And, before all the retrenchment witnessed in 2016, passing the Lisbon Treaty in 2009 was no easy task: perhaps energy is not the best driver for union?

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